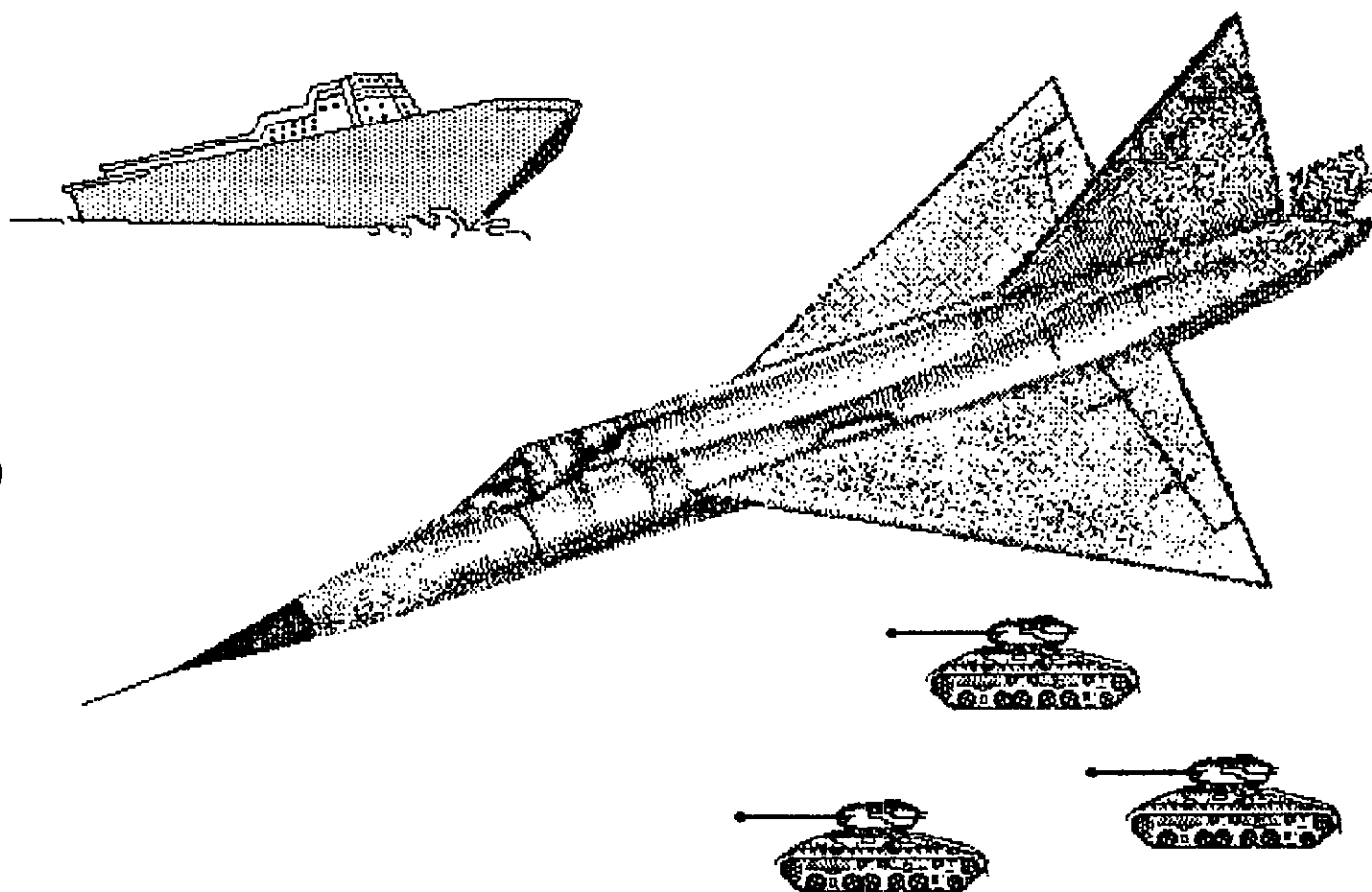


TARGETS TARGETS TARGETS TARGETS TARGETS



DIRECTORY

TARGET
AD HOC GROUP

RANGE COMMANDERS COUNCIL

DOCUMENT 650-88

TARGETS DIRECTORY

Targets Ad Hoc Group
Range Commanders Council

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New Mexico 88002

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FOREWORD

This directory is intended to serve as a quick-look reference of target information for interested Department of Defense agencies and their counterparts in private industry. The document is divided into two sections. Section 1 describes target command and control systems, while section 2 deals with specific aerial, land, seaborne, and tow targets. Appendixes containing lists of government points of contact, target contractors and forms for use in submitting additional points of contact and target information are also provided.

The material contained herein was compiled by the Targets Ad Hoc Group of the Range Commanders Council and does not necessarily reflect Army, Navy or Air Force policy, nor does it present definitive conclusions on the relative merits of the various targets and control systems referenced. Furthermore, the use of trade names and manufacturers in this directory does not constitute official endorsement or approval of any commercial product by the Range Commanders Council or its member or associate member ranges and facilities. Such references are included for information purposes only.

Additional inputs for the directory or comments concerning its contents should be forwarded to

Secretariat
Range Commanders Council
Attn: STEWS-SA-R
White Sands Missile Range, NM 88002

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LIST OF ACRONYMS AND INITIALISMS

ABS.....Airborne Subsystem
 ACTS.....Airborne Control Transponder Sets
 AD.....Armament Division
 AFB.....Air Force Base
 AFWTF.....Atlantic Fleet Weapons Training Facility
 AMRAAM.....Advanced Medium Range Air-to-Air Missile
 APC.....Armored Personnel Carrier
 ASCM.....Antiship Cruise Missile
 BALS.....Ballistic Aerial Target System
 CCF.....Central Control Facility
 CLP.....Circular Error Probability
 CGC.....Command Guidance Computer
 CPU.....Central Processing Unit
 DASH.....Drone Anti-Submarine Helicopter
 DFCS.....Drone Formation Control System
 DLS.....Data Link Subsystem
 DTCS.....Drone Tracking Control System
 EAFB.....Eglin Air Force Base
 EATS.....Extended Area Test System
 ECC.....Extended Channel Controller
 ECM.....Electronic Countermeasures
 ECP.....Engineering Change Proposal
 FAS1.....Floating At Sea Target
 FSI.....Flight Systems Inc.
 GRDCUS.....Gulf Range Drone Control Upgrade System
 HAMITS.....High Agility Modular Integrated Target System
 IAS.....Indicated Air Speed
 IOC.....Initial Operating Capability
 IRCM.....Infrared Countermeasures
 IRIG.....Interrange Instrumentation Group
 IS.....Interrogator Subsystem
 ITCS.....Integrated Target Control System
 JATO.....Jet-Assisted-Takeoff
 JP.....Jet Propelled
 LOS.....Line-of-Sight
 MARS.....Midair Retrieval System
 MILLS.....Multiple Integrated Laser Engagement System
 mpg.....Miles Per Gallon
 mph.....Miles Per Hour
 MSR.....Mobile Sea Range
 MTACS.....Multi-object Tracking And Control System
 NADC.....Naval Air Development Center
 NATC.....Naval Air Test Center
 NATO.....North Atlantic Treaty Organization
 NWC.....Naval Weapons Center
 PMRF.....Pacific Missile Range Facility
 PMTC.....Pacific Missile Test Center
 PPC.....Pulse Position Code
 PRICS.....Portable Radar Tracking Control System
 R³.....Relay, Reporter, Responder
 RAT.....Ram Air Turbine

RATO.....Rocket-Assisted-Takeoff
 RCC.....Range Commanders Council
 RCMAT.....Radio Controlled Miniature Aerial Target
 RF.....Radio Frequency
 RFNG.....Radio Frequency Navigational Grid
 RPV.....Remotely Piloted Vehicle
 RVCS.....Remote Vehicle Control System
 SEPTAR.....Seaborne Powered Target
 TAFB.....Tyndall Air Force Base
 T&E.....Test and Evaluation
 TECOM.....Test and Evaluation Command
 TTCS.....Target Tracking Control System
 UHF.....Ultrahigh Frequency
 USAAKENBD.....U. S. Army Armor and Engineer Board
 UTTR.....Utah Test and Training Range
 VISMOD.....Visual Module
 VSS.....Vehicle Subsystem
 VTCS.....Vega Tracking Control System
 WSMR.....White Sands Missile Range
 YPG.....Yuma Proving Ground

INTRODUCTION

As engineering and scientific technology advances in the development and use of defense systems, there is an increasing need for efficient methods of developing and testing new weapons and weapon systems and for training those who operate them. Manually and remotely controlled targets and drones have proven to be successful, cost-effective tools for evaluating weapon systems and for training personnel. Targets are also used efficiently for developing and testing ancillary equipment and control systems.

The use and variety of targets has increased through the past years. Today, targets are grouped into four broad categories: aerial, land, seaborne, and tow. Within each category several types of targets can be found. Aerial targets include full-scale, subscale, fixed wing, rotary wing, subsonic, and supersonic configurations. Land targets include dune buggies, tanks, and trucks. Seaborne targets include powered and non-powered devices. Tow targets include miniature aerial and seaborne devices.

In this directory, a target is defined as any device substituted for an enemy entity in testing a weapon or weapons control system. Such devices are used to assist in determining the success or failure of weapons or weapon control systems with respect to the following:

1. The system's ability to detect and to recognize the target. Ideally, this task would be performed with sufficient precision so that the

system could fire at the target if desired.

2. The system's ability to track the target once it is detected and recognized. This tracking ability includes three possibilities: moving system, moving target and both moving system and target.

3. The system's ability to engage the target with its weapon or simulated weapon. Ideally, this event would be measured with sufficient iterations such that a circular error probability (CEP) or other statistical value for accuracy, dispersion and altitude could be determined.

4. The system's ability to damage the target. Ideally, the target would have a one-to-one relation with the enemy entity it is replicating with respect to the parameter of single shot/kill probability.

5. The characteristics of a target include, but are not limited to, the following:

- a. It may be fixed or mobile.

- b. It may be deployed on the land, on or under the sea or in the air.

- c. It will emit a physical (optical, acoustical or electrical) signature in an active or passive mode similar to the enemy entity which it replicates.

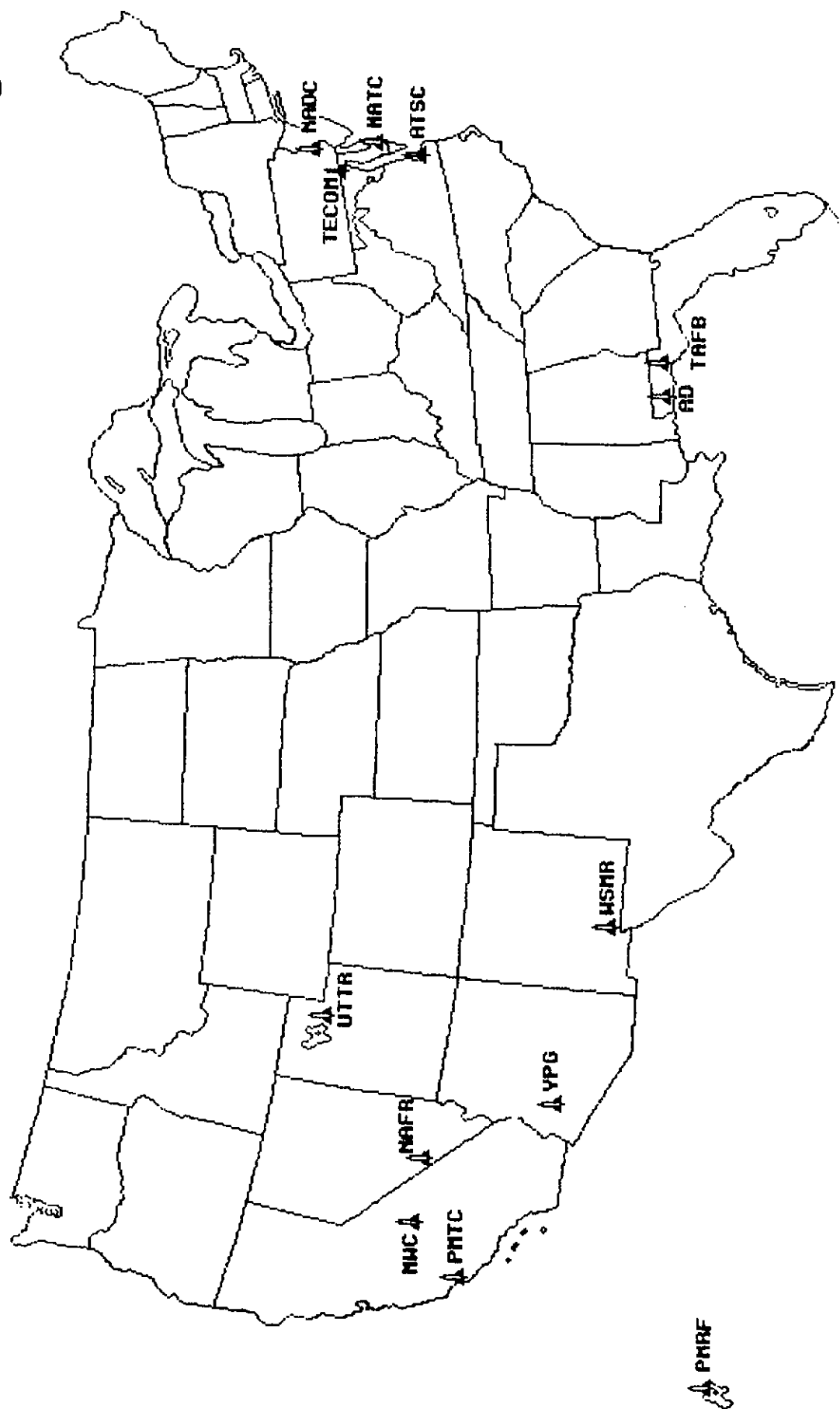
- d. It should be susceptible to the same form of kill mechanism (optical, acoustical,

electrical, blast, or shrapnel) that is lethal to the enemy entity which it replicates.

e. Target related Time-Space-Position Information (TSPI) should be available.

A drone is considered to be an aircraft or helicopter, originally designed for manned aircraft use, which has had the manned instrumentation removed or modified to enable the vehicle to be flown in the manned or droned configuration.

Because targets and drones have a wide variety of capabilities and uses, the tri-services have increasingly emphasized joint coordination and cooperative development and production. The information contained here applies to the operation of targets and target control systems among participating facilities and ranges. See figure 1 for a map of test and evaluation ranges and training facilities associated with the RCC that are involved with targets and target control systems. Figure 2 lists the types of targets used at different installations.



- AD.....Armament Division, Eglin AFB, Fla.
 AFVTF.....Atlantic Fleet Weapons Training Facility, Puerto Rico
 ATSC.....Army Training Support Center, Ft. Eustis, Va.
 NADC.....Naval Air Development Center, Warminster, Pa.
 NAFB.....Nellis Air Force Base, Nev.
 NATC.....Naval Air Test Center, Patuxent River, Md.
 NWC.....Naval Weapons Center, China Lake, Ca.
 PNTC.....Pacific Missile Test Center, Pt. Hugo, Ca.
 PMRF.....Pacific Missile Range Facility, Barking Sands, Ha.
 TAFB.....Tyndall Air Force Base, Fla.
 TECOM.....Test and Evaluation Command, Aberdeen Proving Ground, Md.
- UTTR.....Utah Test and Training Range, Hill AFB, Ut.
 USNR.....Naval Weapons Center, China Lake, Ca.
 YPG.....Yuma Proving Ground, Yuma, Az.

Figure 1. Target installations associated with the Range Commanders Council

INSTALLATION/TARGET CHART

	NAVY	ARMY	AIR FORCE	NATC/PATIENT RIVER, MD	NWC CHINA LAKE, CA	PHTC FT. MUGU, CA	AFWTF PUERTO RICO	PHRF HAWAII	WSMR WSMR, NM	YFG YUMA, ARIZONA	TAFB/EGLIN FLORIDA	OTHER	
FULL SCALE													
QF-86E		♣							♣				
QF-86F	♣				♣	♣	♣						
QF-4	♣				♣	♣							
PQM-102	♣	♣	♣		♣	♣	♣		♣		♣		*
QF-100		♣	♣						♣		♣		
QF-106		♣	♣						♣		♣		**
SUB SCALE													
BQM-34A/S	♣	♣	♣			♣	♣	♣	♣			♣	
BQM-34E/T	♣					♣	♣		♣				
MQM-34D		♣	♣						♣				
MQM-33C												♣	
BQM-74C	♣	♣				♣	♣	♣				♣	
AQM-37A	♣					♣	♣					♣	
AQM-37C	♣					♣	♣					♣	
MQM-107A		♣							♣				
MQM-107B		♣	♣						♣		♣		
MQM-107C													**
AQM-127A	♣					♣	♣						**
BQM-126A	♣					♣	♣	♣				♣	**
AQM-81A			♣								♣		
AQM-81N	♣					♣							
MQM-8ER	♣					♣						♣	
MQM-8G	♣					♣			♣			♣	
MQM-8X	♣					♣							
BATS												♣	

- * EXTINCT
- ** DEVELOPMENTAL
- *** DEPLOYED

Figure 2. Types of targets used at different installations

INSTALLATION/TARGET CHART

	NAVY	ARMY	AIR FORCE	NATC/PATUENT RIVER, MD	NWC CHINA LAKE, CA	PNTC PT. MUGU, CA	AFWTF PUERTO RICO	PMRF HAWAII	WSHR WSHR, NM	YPC YUMA, ARIZONA	TAFB/EGLIN FLORIDA	OTHER	
ROTARY WING													
QH-50	✈	✈			✈				✈				
QUH-1		✈							✈				
LAND													
QLT-1C	✈	✈			✈		✈			✈			
M-41			✈		✈						✈		
M-47		✈	✈		✈				✈		✈		
M-48			✈								✈	✈	
M-53			✈								✈	✈	
M-59			✈								✈		
M-114			✈								✈	✈	
M-135			✈								✈		
M-151			✈								✈		
SEA- BORNE													
QST-33	✈			✈		✈	✈	✈				✈	
QST-35	✈			✈		✈	✈	✈				✈	
EXCALIBUR	✈			✈									***
SHIP HULK	✈			✈									***
MK-42 MOD 0	✈												***
MOCK SUBMARINE	✈												***
RAFTS	✈												***
T-459			✈								✈		

* EXTINCT
 ** DEVELOPMENTAL
 *** DEPLOYED

Figure 2. Types of targets used at different installations (con't)

INSTALLATION/TARGET CHART

	NAVY	ARMY	AIR FORCE	NATC,PATUENT RIVER, MD	NWC CHINA LAKE, CA	PHTC FT. HUDGU, CA	AFWTF PUERTO RICO	PHRF HAWAII	WSHR WSHR, NM	YPG YUMA, ARIZONA	TAFB/EGLIN FLORIDA	OTHER	
TOW													
TDU-32A/B	♂					♂						♂	
TDU-32B	♂					♂						♂	
TDU-10B	♂		♂									♂	
TDU-34/A	♂					♂	♂					♂	
TRX-4/4A		♂											
TA-8 TOWBEE		♂											
LOFAT	♂			♂									
LCTT	♂												***
TRIMARAN	♂					♂						♂	
WILLIAMS	♂					♂						♂	

* EXTINCT
 ** DEVELOPMENTAL
 *** DEPLOYED

Figure 2. Types of targets used at different installations (con't)

SECTION 1
TARGET COMMAND/CONTROL SYSTEMS

INTEGRATED TARGET CONTROL SYSTEM (ITCS)

The Integrated Target Control System (ITCS) is a modular group of compatible subsystems that provides remote and relay control of ground, sea, and air target vehicles and of pilotless aircraft. It is a time-division multiplex, multiple-target system that operates on a single command radio frequency (RF) plus a single telemetry RF in any mission complex. Each single-target control station and each target tracker of a multiple-target control station is assigned a specific time slot during which all command, telemetry, and target position data are updated. A capability is provided for the synchronization of all control stations in the mission complex using Inter-range Instrumentation Group (IRIG) time such that the time slots are kept serial and free from interference because transmission overlap occurs.

Subsystems include ground control stations, target vehicle subsystems and ground support equipment to test and to maintain the subsystems. The ground control stations can perform in a variety of operational configurations and environments, and they can be adapted for use as a target control system on major target ranges, where remote tracking sites are required for improved range coverage. The ground stations can be interfaced with other range instrumentation when necessary.

The ITCS consists of three types of ground control stations. The first type, AN/USW-4, is a mobile ship or land-based station which provides the tracking, controlling, position displaying, and performance mon-

itoring of single targets out to a range of 93 kilometers (50 nautical miles) and up to an altitude of 30,500 meters (100,000 feet). The second type, AN/TSW-10, is a transportable ground-based station which provides for tracking, controlling, position displaying, and performance monitoring of a target at line-of-sight ranges of 0.37 to 463 kilometers (0.2 to 250 nautical miles) and up to an altitude of 30,500 meters (100,000 feet). Although the basic AN/TSW-10 station will track and control only one drone, it has the ability to hand off its target to another station at another location. Colocated AN/TSW-10 stations are time synchronized for multiple drone control on a single frequency pair. One antenna and an RF group are required for each target. The last type, AN/TSW-10(V), is used at major ranges. The equipment, located at local and remote sites, uses a variation of the basic AN/TSW-10 station. Each variation includes unique hardware designed to the particular needs of the range.

There are two types of target vehicle subsystems (VSS). The first, AN/DKW-2A, is an airborne transponder set designed to interface directly with the BQM-34S and BQM-34T targets and to readily adapt to other targets having comparable command and telemetry capacity and interface requirements. The second, AN/DKW-3A, is a smaller, lower-cost airborne transponder set used with the BQM-74C Chucker targets. It, too, can be readily adapted for use with other targets having command and telemetry capacity requirements.

comparable to that of the BQM-74C such as the MQM-107 Streaker training target. Both types of target vehicle subsystems are compatible with all ITCS control stations and require no additional interface. The AN/DKW-3A, second generation of the DKW-3, provides all 17 ITCS commands and accepts all 17 ITCS telemetry words. This transponder is now in use in the QF-86F and QF-4N/S targets.

Development of the ITCS began in 1970 when the U. S. Navy awarded a program development contract to the Government Electronics Division, Motorola, Inc. The ITCS is used simultaneously at the following fleet training ranges for the command and control of multiple targets:

Pacific Missile Test Center (PMTTC), Point Mugu, California;

Atlantic Fleet Weapons Training Facility (AFWTF), Roosevelt Roads, Puerto Rico;

Fleet Composite Squadron Six (VC-6), Dam Neck, Virginia;

Naval Weapons Center (NWC), China Lake, California; and

Pacific Missile Range Facility (PMRF), Barking Sands, Hawaii.

These ranges have a local and a remote site. The local site commands the drones and displays the telemetry data. The remote site contains the tracking antenna and the equipment needed to receive, demodulate, decode, and transmit this data over a microwave link to the local site. With one local site and six multiple remote sites, the

full ITCS capability of six targets can be controlled, commanded and handed off simultaneously.

The ITCS is designed to operate with any of the following target/drone vehicle types:

AQM-81A

AQM-127A

BQM-34A/S

BQM-74C

BQM-126A

MQM-34D

MQM-107

S/T

QST-33

QST-35

QF-4N/S

QF-86F

QM-41

This information was obtained from ITCS AN/USW-3: Integrated Target Control System. Motorola, Inc., August 1981.

EXTENDED AREA TEST SYSTEM (EATS)

The primary functions of the Extended Area Test System (EATS) include participant tracking, telemetry data collection, UHF communications relay, and target control relay. Participant tracking has been accomplished through the development of a transponder called a Relay, Reporter, Responder (R³), which is installed aboard all participants, including ground and airborne stations. The R³ unit allows direct interparticipant range measurements and enables signal path diversity; that is, two participants equipped with R³ units need not be within radio line-of-sight to communicate through an intermediate R³ unit functioning as a relay. The R³ unit has a digital input/output interface which provides the capability for, among other things, target drone command and control. Telemetry data is collected through an airborne phased-array antenna system on a P-3A aircraft, which has the capability to record onboard or retransmit in real time to the Range Operation Control Center. The P-3A aircraft also provides UHF communication relay capability, target control relay capability, and another airborne R³ reference station for multilateral tracking.

Target drone command and control is performed using the target-control consoles at the ITCS facility at Point Mugu, California.

The EATS provides a two-way relay between target vehicles and the Pacific Missile Test Center (PMTC), Integrated Target Control System (ITCS). The EATS interface with the ITCS ground

equipment will accept target commands from the ITCS target-control consoles, relay them to target drones in the extended area in appropriate time slots, accept target telemetry data from the targets, and relay it back to Point Mugu for transfer to the ITCS target-control consoles in appropriate time slots.

The EATS was developed by General Dynamics Electronics in 1975 and is currently in use at Pacific Missile Test Center, Point Mugu, California. The following target vehicles are currently supported:

BQM-34S

QST-33

QST-35

This information was obtained from a write-up by R. L. Nifong, EATS Program Manager, Pacific Missile Test Center, Point Mugu, California 93042.

VEGA TRACKING AND CONTROL SYSTEMS

Vega Precision Laboratories provides modular tracking and control systems for target vehicles and remotely piloted vehicles (RPV) in a wide variety of configurations. Ground stations may be fixed sites, transportable shelters, mobile units, or portable systems. The ground stations work with Airborne Control Transponder Sets (ACTS), which are generally configured (electronically and mechanically) for the specific vehicle in which they are to be deployed. The various combinations of ground stations and airborne packages provide operating ranges from 30 yards to 150 nautical miles.

All of Vega's tracking and control systems use Pulse-Position-Code (PPC) modulation for command and control (uplink) as well as telemetry (downlink) data transmission. This commonality in the modulation technique creates a family of totally compatible systems for complete target control within one frequency band. Vega's Pulse-Position-Code format is also interfaced with range instrumentation radars providing the capability to communicate with unmanned vehicles as far away as the range capabilities of the radar. This interfacing is accomplished through a radar electrical track which uses the radar-to-transponder path for vehicle commands and the transponder-to-radar path for telemetry data.

The control system developed by Vega includes the Model 6104 Transportable Shelter Target Tracking Control System (TTCS) which is an intermediate system

with mini-computer control and data recording capability. The Model 6157 Portable Radar Tracking Control System (PRTCS) lacks data recording capability.

Vega's most recent and complex addition to the Drone Tracking Control System (DTCS) is the AN/FPQ-18 radar, which draws heavily on Vega's Model 6104 TTCS. This system features multiple uplink and downlink PPC formats, elevation-over-azimuth, high-gain performance radar pedestal system with a three-channel monopulse receiver/processor and computer-generated graphics for presentation of drone X-Y-H parameters and flight instrumentation data in real time. The multiple processor-based system provides for data analysis as well as real-time operation.

At the present time, there are approximately 40 Vega tracking and control systems operational worldwide, flying a variety of targets and unmanned vehicles.

Vega systems are presently in use at White Sands Missile Range, New Mexico; Eglin-Tyndall Range Complex, Florida; Fort Bliss, Texas; Wallace AFS, Philippines; Pacific Missile Test Center, California; Fleet Composite Squadron Six (VC-6), Virginia; Fleet Composite Squadron Five (VC-5), Philippines; Naval Air Test Center, Maryland; Fort Huachuca, Arizona; Yuma Proving Ground, Arizona; Pohakuloa Training Area, Hawaii; Pacific Missile Range Facility, Hawaii; Kwajalein Atoll, and over 12 foreign countries.

These systems are compatible
with the following targets:

BQM-74C

MQM-107A/B

MQM-34D

BQM-34A/S

BQM-34L/F/T

PQM-102

QI-86L

QI-100

QUH-1

QH-50

This information was obtained
from Vega Precision Laborator-
ies, Inc., 800 Follin Lane,
Vienna, Virginia 22180, (703)
938-6300, April 1986.

DRONE FORMATION CONTROL SYSTEM (DFCS)

The Drone Formation Control System (DFCS) is a ground-based, computer-controlled, microwave-tracking, telemetry and control system. The IBM Corporation was selected by the Army in 1975 to develop the system, which has been operational since February 1977.

The DFCS is installed at the U.S. Army White Sands Missile Range. The range is 40 miles wide by 160 miles long and is located in south-central New Mexico. The drone control center is located at the south end of the range. Five ground tracking stations, interrogator subsystems, are located on mountain peaks ranging from 6,500 to 9,000 feet above mean sea level with a sixth station being collocated with the drone control center. A seventh ground station, used for automatic takeoffs and landings, is located at Holloman AFB, New Mexico. The stations are arranged roughly in a 40- by 70-mile rectangle for maximum tracking coverage. Temporary or mobile stations can be used to enhance system operations. An airborne subsystem unit (ABS-II), installed in the drone, serves as a data link transponder for DFCS and provides a bidirectional interface between the data link and system onboard the drone.

Tracking and control are accomplished by using distance measuring techniques with a single, L-band, time-shared, RF data link transponder in each drone and at any three ground stations. The computer and control subsystem directs the RF data link in the choice of ground stations and airborne

units and generates commands to control the drones. The computer and subsystem are interlaced to a display and control subsystem located in the drone control center. The display and control subsystem provides system management and a manual drone control capability when intervention is necessary.

Independently and automatically, the DFCS accomplishes the following:

1. Control of up to six drones in single or multiple formation. Drones can be controlled on independent or synchronized flight paths at distances up to 100 miles.

2. Track ten drones, yielding a track only capability of four targets over the number of controlled drones.

3. Track and control aerial targets as low as 100 feet above ground level to as high as where the airborne drone will still exhibit good control response characteristics.

4. Fly aerial targets with formation spacing of 200 feet between drones.

The DFCS is designed to operate with the following target vehicle types:

M-47

QF-86

PQM-102

QF-100

BQM-34A

QBH-1 (tracking)

3/4-ton pickup (tracking)

This information was obtained from "Drone Formation Control System." Technical Directions, volume 9, number 1, IBM Corporation, 1983.

GULF RANGE DRONE CONTROL UPGRADE SYSTEM (GRDCUS)

The Gulf Range Drone Control Upgrade System (GRDCUS), an Air Force effort with assistance from RCA and IBM, operates as a multifunction command and control tracking and data link system capable of supporting developmental and operational test and evaluation of air-to-air missions over the Gulf Range.

The GRDCUS is designed to conduct typical six-phased missions which include preflight, launch, enroute, mission, recovery, and landing (and destruct if necessary). The GRDCUS capabilities are being developed in two phases. Phase I provides the following capabilities: (1) command and control of up to four QF-100 drone aircraft including formation flight and automatic takeoffs and landings; (2) automatic drone control with 200-foot separations between drones; (3) simultaneous track of four drones, two shooter aircraft and four support aircraft (T-33s); and (4) selective flight termination of all drones. Phase II will complete the GRDCUS capabilities. These capabilities are (1) command and control the MQM-107B drone, (2) track two additional shooter aircraft, (3) track up to four missiles, and (4) terminate selectively the flight of one to four missiles.

The GRDCUS comprises four basic subsystems: the control subsystem, the interface subsystem, the console/display subsystem, and the data communications subsystem. An extensive microwave system, shared with other Gulf Range activities, supports

data exchange and voice communications between the GRDCUS subsystems.

The main ground portions of the system are located at Tyndall AFB, with a communication/data link to the Central Control Facility at Eglin AFB. There are also a number of ground stations along the Florida coast and around Tyndall AFB's drone runway. The ground stations as well as the T-33 support aircraft links the target drone to the main computer by means of a Data Link Subsystem (DLS) or Airborne Subsystem (ABS-II) unit. On the drone itself, the DLS or ABS-II unit interfaces with the autopilot to control the aircraft.

The GRDCUS is designed to operate with the following target/drone vehicle types:

QF-100

QF-106

MQM-107B

This information was obtained from the summary description of the Gulf Range Control Upgrade System (GRDCUS), GRDCUS TFG-4, February 1981.

EGLIN AIR FORCE BASE REMOTE VEHICLE CONTROL SYSTEMS

The Eglin Ultrahigh Frequency Remote Vehicle Control Systems (UHF RVCS) are designed primarily for installation in manually operated, remotely controlled vehicles on land and sea. The UHF RVCS are maintained and operated by the Remote Control Targets Section of the 3242 Avionics Maintenance Squadron.

Command control of remotely piloted vehicles is accomplished by an ARF Products AT-12 radio transmitter operating on either 28 volts dc or 115 volts ac. The transmitter frequency may be selected in 1-MHz steps through the 406 to 425-MHz range. The AN/DRW-29 receivers are used in the target vehicles. Twenty commands are available with 20 separate channels which give the capability to control two vehicles simultaneously. In case of component failure, the system automatically shuts down. Commands that may be transmitted are left, right, increase, decrease, fuel shutoff, and ignition. These commands may be changed to fit requirements.

A computer enhanced UHF system, which is being checked-out, will replace the encoder on the transmitter with a Motorola 68701 central processing unit (CPU). The CPU polls the eight input ports (16 ports with re-wiring) for a command, codes the command for a certain vehicle and transmits the command in biphasic logic. In this system, the AN/DRW-29 receiver is replaced with a command destruct receiver AR-9 and a Motorola 68701 CPU. This CPU takes the biphasic logic from the receiver,

compares the code with its preset vehicle code, and if the same, executes the command. Comparators tell the computer when the commanded servo position has been reached. With a carrier loss, the throttle decreases, the brakes engage and the engine shuts down. Up to 16 vehicles with separate identification codes can be controlled over a common UHF frequency. In addition, up to 16 commands can be provided per vehicle.

The system is made to fit all types of vehicles such as jeeps, trucks, tanks, armored personnel carriers, and target boats. A vehicle can be modified and checked out with equipment installed in 40 hours. A minimum of two persons per vehicle is required to set up and operate the system. The vehicles are normally used in a visual straight line course; however, line-of-sight or microwave video link may be used. Live munitions can be used against the target to evaluate the munition guidance system and damage assessment.

This information was obtained from the Technical Facilities Manual, volume 1. Range Instrumentation System and Technical Support Facilities.

MULTI-OBJECT TRACKING AND CONTROL SYSTEM (MTACS)

The Multi-Object Tracking and Control System (MTACS) provides a real-time capability of tracking multiple targets, missiles and aircraft over Eglin's land and water ranges. Multiple targets such as tanks and trucks can be controlled automatically in formation over several of Eglin's land range test areas. Scoring and selective flight termination of multiple missiles can be provided.

An Air-to-Surface/Electronic Combat range is being developed to simultaneously track up to 10 targets, 12 missiles, 10 aircraft, and to provide ± 12 feet Time-Space-Position Information (TSPI) on each participant. The ten targets can be automatically controlled in tactical formation. In addition, 12 missiles can be selectively destroyed, if necessary, through the data-link system. Scoring of missile/target intercepts will be provided to ± 3 feet. All of these functions are under the direct control of the Central Control Facility. It is possible to track down to 200 feet over the Eglin test complex and down to ground level on various test areas. Tracking range measurements by real-time computing is obtained from time-of-arrival messages on the 915-MHz data link.

The track and control of ten M-47 tanks was demonstrated. Tracking pods were developed and tested to mount on an AIM-9 station for any F-4, F-15, or F-16 aircraft. Ground station transponders are located on the test range to provide range-wide coverage. These ground stations are unmanned, have remote turn-

on/off capability and have battery backup power systems. The MTACS can interact with the Gulf Range Drone Control Upgrade System (GRDCUS) to provide TSPI on the Eglin/Tyndall water ranges. Future developments include the use of the Global Positioning System for direct and relative position and rate information.

During the development of the full air-to-surface/electronic combat capabilities of the system, the tank vehicle equipment was placed in storage. However, the TA B-70 and tank target capability can be restored within four to six months upon the acceptance of priority requirements. For live-fire requirements, replacement cost of target vehicle and data-link equipment is \$150,000 for each vehicle destroyed.

This information was obtained from the Technical Facilities Manual, volume 1, Range Instrumentation System and Technical Support Facilities.

REMOTE CONTROL PROGRAM

Since 1978, Kaman Sciences Corporation's Remote Control Program has been supporting the government with remotely controlled target vehicles using two Kaman control systems: the Radio Frequency Navigational Grid (RFNG) autonomous control system and the Line-of-Sight (LOS) remotely operated control system.

RADIO FREQUENCY NAVIGATIONAL GRID SYSTEM

The Radio Frequency Navigational Grid System provides remote control of a single ground vehicle over a preprogrammed path. The system consists of two major subsystems: a specially designed and transportable radio frequency position reference system, and an on-vehicle receiver and microcomputer, which together determine vehicle location and issue commands to servomechanisms that operate the vehicle controls. The microcomputer is programmed for a particular target mission by an operator who manually drives the vehicle over the intended course. During programming, radio data are encoded by vehicle microcomputer and stored in memory. An unmanned target mission is carried out by the microcomputer, which compares current radio information with the stored data to determine and to command appropriate manipulations of the vehicle's controls. The vehicle precisely repeats the programmed path.

The use of this "distributed processing" approach to vehicle control allows each vehicle in

an array to operate autonomously, thus reducing the probability of random catastrophic target array failure because of the failure of a single system element. As many vehicles as desired may, therefore, be operated simultaneously in single missions of up to one hour or 15 kilometers. The target mission does not require operators, observers or radio line-of-sight, thus allowing operations under all terrain and weather conditions.

Detailed design and development of this system began in 1973, sponsored by the U.S. Army Operational Test and Evaluation Agency, through the Tank-Automotive Command. Target systems have been fabricated for and used in operational tests of COPPERHEAD, Infantry Fighting Vehicle (XM-2), MAVERICK, HELL-FIRE, MULL, DEAD-EYE, and Advanced Attack Helicopter. When not deployed for weapon system evaluation, the equipment has been used to provide enhanced realism in tank gunnery training.

The Radio Frequency Grid System, presently deployed at Yuma Proving Ground, Arizona, is designed to operate with any tracked or wheeled vehicle controlled by an accelerator pedal, a brake pedal and a steering wheel or T-bar.

This information was obtained from A New Concept for Remote Control of Vehicles in Realistic Tactical Exercises, Kaman Sciences Corporation, Summer 1981.

LINE-OF-SIGHT SYSTEM

The companion vehicle remote control system, Line-of-Sight (LOS), is a more conventional visual teleoperational system in which the vehicle is controlled through a radio link by an operator. The Kaman Sciences LOS system has improved line-of-sight techniques by operating in the military high frequency telecommand band, employing digital command transmissions, allowing up to six vehicles to be operated simultaneously from one transmitter with a separate control unit, providing a number of discrete commands, and allowing the system to be insensitive to intermittent jamming and signal dropout.

The LOS system is microcomputer-based and uses certain common hardware items with the RFNG such as cables, antennas, transmitters, servo amplifiers, and servomechanisms. A user who has access to both systems can choose the most effective or economical system for the application.

CONCEPT 880 AND VISUAL MODULES

The Concept 880 and visual modules are two types of targets used in the Remote Control Program. The Concept 880, developed by the Kaman Sciences Corporation for testing target systems and training personnel, is lightweight and unmanned. These maneuverable replicas of threat vehicles can be deployed alone or with multiple arrays for live fire and field use. Fiberglass shells or visual modules (VISMODs) can be used to cover M-880 or other government vehicles. When these vehicles

are equipped with Kaman control systems, they present realistic threat formations, complete with appropriate signatures, Multiple Integrated Laser Engagement System (MILES) detectors and other operational characteristics.

This information was obtained from Unmanned Vehicle Navigation and Control Systems. BDU number 0386, Kaman Sciences Corporation, 1986.

HIGH AGILITY MODULAR INTEGRATED TARGET SYSTEMS (HAMITS)

(WIRE FOLLOWING SYSTEM)

The High Agility Modular Integrated Target System (HAMITS) is a U. S. Army Armor and Engineer Board (USAAKLELB) instrumentation development which consists of two major subsystems. The first subsystem is the carrier vehicle designed and fabricated by the Instrumentation Service Division of the Geotechnical Laboratory at the U. S. Army Waterways Experiment Station. The second subsystem is the Visual Module (VISMUD) which gives the carrier the appearance of a threat vehicle.

The carrier vehicle subsystem is a modified 4x4 diesel 3/4-ton truck configured for microprocessor control along a ground-emplaced control wire. It has a demonstrated speed range of 0 to 50 mph, a range of seven miles over a closed loop, a maximum lateral acceleration of 0.5 g in tight turns, a position accuracy/repeatability of ± 0.1 meter, and a speed accuracy/repeatability of ± 0.3 mph. The vehicle has a number of noteworthy characteristics over the basic requirements summarized above. Because of the microprocessor control, the vehicle is not limited by a requirement to follow the wire exactly as emplaced. Rather, it can maneuver freely as long as the wire remains under the vehicle. The vehicle will remember and repeat everything when it makes subsequent runs over the course. The vehicle can be controlled by an on-board operator, a remote operator or the instructions can be stored in the memory of the on-board microprocessor. Control can be

transferred between operators and the vehicle memory as desired, and any part of a learned course can be altered at any time if an operator so desires. From on-board, the vehicle can be driven manually, programmed to run a specific course, or run on its own in a preprogrammed mode. While in a preprogrammed mode, the vehicle can be overridden or reprogrammed by either an on-board or remote operator. Moreover, if the vehicle veers a short distance off of the wire, it will find its way back. If it no longer detects the carrier signal in the wire, it will stop. By branching the wire, the vehicle can be made to switch courses, and the system is designed to permit multiple vehicles to operate simultaneously on the same wire. Each vehicle reports its position on the wire to the operator control unit in a time-tagged, real-time data stream. This signal is suitable for the capture and real-time display of vehicle speed, acceleration and position location.

The VISMUD subsystem is a family of threat-vehicle shells which interchangeably mounts on the carrier vehicle using common attachment points. The VISMUDs replicate the visual, infrared, millimeter wave, and laser reflectivity signatures of the targets they simulate. The attachment mechanisms are dampened to decouple the vehicle and VISMUD motions, so that the system produces a realistic motion signature. In addition, the VISMUDs are equipped with

hard points suitable for mounting instrumentation equipment.

The VISMUD subsystem is under development and is currently operational in limited quantities. Full operational capability should be achieved in 1988.

SECTION 2

TARGETS

TARGET: Aerial

DESIGNATION: QF-86E

AUGMENTATION: Infrared, visual
aids, scoring, ECM

COMMON NAME: Sabre

CHARACTERISTICS:

TYPE: Full-scale target

Height: 14 feet, 8 inches

Length: 37 feet, 7 inches

MANUFACTURER: Flight Systems,
Incorporated

Wing Span: 37 feet

STATUS: Operational (No drones
available as of April 1988.)

Weight: Launch 14,200
pounds

Speed: Maximum Mach 0.92

MILITARY USER: Army

Altitude: Maximum 45,000 feet
mean sea level

OPERATING SITES: White Sands
Missile Range

Endurance: 2 hours

LAUNCH: Runway

RECOVERY: Runway

POWERPLANT: Orenda 10 turbojet

PURPOSE: Test and evaluation of
air defense systems.

CAPABILITIES: Manned or unmanned
flight. Maximum load factor
7 gs.

CONTROL SYSTEM: Remote control
by Vega system or Drone Forma-
tion Control System (DFCS).

TARGET: Aerial

DESIGNATION: QF-86F	display in simulator cockpit for use during takeoff and landing.
COMMON NAME: Sabre Jet	
TYPE: Full-scale, subsonic, remotely controlled version of Navy F-86 Sabre jet.	AUGMENTATION: Radar, infrared, countermeasures, IRCM, scor- ing, and tracking and visual aids.
MANUFACTURER: Navy inventory, Naval Weapons Center contract.	CHARACTERISTICS:
	Height: 14 feet, 8 inches
STATUS: Operational, future procurement	Length: 37 feet, 6 inches
	Wing Span: 37 feet, 1 inch
MILITARY USER: Navy	Weight: Not available
	Speed: Maximum Mach 0.75
OPERATING SITES: Atlantic Fleet Weapons Training Facility, Naval Weapons Center, Pacific Missile Test Center	Altitude: 35,000 feet
	Endurance: 1 hour, 30 minutes
LAUNCH: Runway	Related Information: A scenario of up to six QF-86F targets can be presented in formation depending on the number of ITCS tracks available. How- ever, operation of the QF-86F target at AFWTF requires a deployment from PMTC and is limited to single target pre- sentations.
RECOVERY: Runway	
POWERPLANT: J-47 jet engine which produces 6,090 pounds of thrust.	
PURPOSE: Simulates fighter jet threat.	
CAPABILITIES: High maneuver- ability of lightweight fighter jets.	
CONTROL SYSTEM: ITCS, nose- mounted television camera in the target provides visual	

TARGET: Aerial

DESIGNATION: QF-4N/S

COMMON NAME: Phantom

TYPE: Full-scale, supersonic,
high altitude, remotely controlled target

MANUFACTURER: Navy aircraft
converted under NWC contract
or by Naval Air Rework Facility
at Cherry Point, North Carolina.

STATUS: Operational, future
procurement

MILITARY USER: Navy

OPERATING SITES: Pacific Missile
Test Center, Naval Weapons Center

LAUNCH: Runway

RECOVERY: Runway

POWERPLANT: Two J79-GF-8 turbojets
which develop 10,900 pounds of thrust
each and 17,000 pounds of thrust each
with afterburner.

PURPOSE: Simulates supersonic
aircraft threat.

CAPABILITIES: All altitudes,
variable speed, manned or
droned flight.

CONTROL SYSTEM: Features ITCS
with nose-mounted television
for remote takeoff and
landing.

AUGMENTATION: Radar, counter-
measures, IRCM, scoring,
towing, and tracking and
visual aids.

CHARACTERISTICS:

Height: 16 feet, 5 inches

Length: 58 feet, 2 inches

Wing Span: 38 feet, 4 inches

Weight: 46,800 pounds

Speed: Maximum Mach 2.2

Altitude: Maximum 58,000 feet

Endurance: 25 minutes at Mach
0.87 plus 5-minute dash at
Mach 2.

RELATED INFORMATION: The QF-4N/S
replaces the UHF controlled
DQ-4B. Production of the
DQ-4B was terminated in favor
of the ITCS configured QF-4N/S.

TARGET: Aerial

DESIGNATION: PQM-102

COMMON NAME: Converted Delta
Dagger

TYPE: Full-scale, supersonic
target

MANUFACTURER: Sperry Flight
System

STATUS: Supply exhausted in
1986; replaced by QF-100.

MILITARY USER: Air Force, Army,
Navy

OPERATING SITES: Atlantic Fleet
Weapons Training Facility,
Naval Weapons Center, Pacific
Missile Test Center, White
Sands Missile Range, Tyndall
Air Force Base

LAUNCH: Runway

RECOVERY: Runway

POWERPLANT: One Pratt and
Whitney J57-P-23A turbojet
engine.

PURPOSE: Supports test and eval-
uation of ground-to-air mis-
siles.

CAPABILITIES: Automatic takeoff
modes, takeoff abort, full-
scale and preprogrammed maneu-
vers, maximum maneuverability
8 gs, loss-of-command carrier,
manned or unmanned flight con-
figurations, 42,000 pounds
maximum payload.

CONTROL SYSTEM: Dual Vega com-
mand guidance and telemetry
systems, DFCS, TTCS.

AUGMENTATION: Visual aids,
DIGIDUPS scoring

CHARACTERISTICS:

Height: 21 feet, 2 inches

Length: 68 feet, 4 inches

Wing Span: 38 feet, 1 inch

Weight: Operational 31,276
pounds

Speed: Maximum Mach 1.2

Altitude: Maximum 56,000 feet

Endurance: 40 to 55 minutes
depending on afterburner use
and altitudes.

TARGET: Aerial

DESIGNATION: QF-100

for takeoff and landing, command carrier loss and manned or unmanned flight configurations.

COMMON NAME: Converted Super Sabre

TYPE: Full-scale, supersonic, single-seat, fighter-bomber aircraft target

CONTROL SYSTEM: Vega (mobile or fixed ground stations), DTCS, DFCS.

MANUFACTURER: Sperry Flight Systems

AUGMENTATION: Visual aids, scoring, target auxiliary systems

STATUS: Operational, replaces PQM-102

CHARACTERISTICS:

Height: 16 feet

MILITARY USER: Air Force, Army

Length: 47 feet

Wing Span: 38 feet

OPERATING SITES: White Sands Missile Range, Tyndall Air Force Base

Weight: Loaded 28,000 pounds

Speed: Mach 1.2

LAUNCH: Runway

Altitude: Maximum 50,000 feet

Endurance: 40 to 55 minutes

RECOVERY: Runway

POWERPLANT: One Pratt and Whitney J57-P-21A turbojet engine rated at 16,950 pounds static thrust with afterburner.

PURPOSE: Provides air-to-air and ground-to-air missile evaluation and combat training.

CAPABILITIES: Full-scale aircraft maneuvers (preprogrammed) to 8 gs with maneuverability of 5.5 gs sustained to 7gs for 120° of turn. Automatic modes

TARGET: Aerial

DESIGNATION: QF-106

AUGMENTATION: ECM, IRCM

COMMON NAME: Delta Dart

CHARACTERISTICS:

TYPE: Full-scale aircraft target

Height: 18 feet, 3 inches

Length: 72 feet

MANUFACTURER: Sperry Company
(Awarded June 1986)

Wing Span: 38 feet, 6 inches

Weight: 25,690 pounds

STATUS: Developmental, IOC
expected September 1989

Speed: Maximum Mach 2.0

Altitude: Maximum 60,000 feet
mean sea level

MILITARY USER: Army, Air Force

Endurance: 1 hour, 30 minutes

OPERATING SITES: Projected use -
White Sands Missile Range,
Tyndall Air Force Base

LAUNCH: Runway

RECOVERY: Runway

POWERPLANT: One Pratt and
Whitney J-75-810 turbojet
engine

PURPOSE: Provides full-scale
target for air-to-air and
ground-to-air missile evaluation,
development, and testing
and for training personnel.

CAPABILITIES: Formation flight,
maneuvers to 8 gs.

CONTROL SYSTEM: Compatibility
with DTCS, DFCS, GRDCUS, VEGA.

TARGET: Aerial

DESIGNATION: BQM-34A/S

used in test and evaluation,
training, and quality
assurance of weapons system.

COMMON NAME: Firebee I

TYPE: Subscale, remotely controlled, high-speed, subsonic target

MANUFACTURER: Teledyne Ryan

STATUS: Operational, future procurement

MILITARY USER: Air Force, Army, Navy

OPERATING SITES: Atlantic Fleet Weapons Training Facility, Pacific Missile Test Center, Pacific Missile Range Facility, White Sands Missile Range, Mobile Sea Range

LAUNCH: Short rail or zero-length ground launcher using a single jet-assisted-takeoff (JATO) bottle. Can be air launched from suitably modified aircraft. Navy has launched from ships.

RECOVERY: Recoverable; two-stage parachute deployment, on land or sea (boat or helicopter) recovery.

POWERPLANT: Single J-69 turbojet engine which produces 1,700 pounds of thrust at full throttle at sea level.

PURPOSE: Simulates subsonic aircraft, antiship cruise missile, and sea-skimmer threat;

CAPABILITIES: Target is controllable through normal flight maneuvers up to 5 gs. Also used for a Mobile Sea Range (MSR) scenario (preprogrammed for climbs, altitude, dives, and level offs). Can tow unpowered targets.

CONTROL SYSTEM: The BQM-34A (Air Force) is equipped with the Vega Drone Tracking and Control System (DTCS). The BQM-34S (Navy) is equipped with the Motorola Integrated Tracking and Control System (ITCS). Can include microwave command and guidance system to control beyond line-of-sight from ground station through airborne relay station.

AUGMENTATION: Active and passive radar, infrared, emitter, countermeasures, IRCM, scoring, and tracking and visual aids.

CHARACTERISTICS:

Height: 6 feet, 8 inches

Length: 22 feet, 9 inches

Wing Span: 12 feet, 10 inches

Weight: Launch 2,500 pounds

Speed: Maximum Mach 0.9

Altitude: 50 to 50,000 feet

Endurance: 1 hour, 15 minutes

TARGET: Aerial

DESIGNATION: BQM-34E/T

AUGMENTATION: Radar, infrared
emitter, countermeasures,
IRCM, scoring, and tracking
and visual aids.

COMMON NAME: Firebee II

TYPE: Subscale, remotely con-
trolled, supersonic missile
target

CHARACTERISTICS:

Height: 5 feet, 6 inches

Length: 28 feet, 3 inches

Wing Span: 8 feet, 9 inches

Weight: Not available

Speed: Maximum Mach 1.7

Altitude: Maximum 60,000 feet

Endurance: 1 hour, 10 minutes

MANUFACTURER: Teledyne Ryan

STATUS: Operational, no further
procurement

MILITARY USER: Navy

OPERATING SITES: Atlantic Fleet
Weapons Training Facility,
Pacific Missile Test Center,
White Sands Missile Range

LAUNCH: Aircraft or ground
launch.

RECOVERY: Parachute recovery,
land or sea (boat or helicop-
ter).

POWERPLANT: Y-69 turbojet
engine.

PURPOSE: Simulate supersonic,
aircraft, antiship cruise mis-
sile, and sea-skimmer threat.

CAPABILITIES: Can perform preset
maneuvers up to 5 gs.

CONTROL SYSTEM: ITCS, DTCS

TARGET: Aerial

DESIGNATION: MQM-34D

and evaluation, quality assurance and air defense weapon system training.

COMMON NAME: Firebee

TYPE: Subscale, remotely controlled, high-speed, subsonic target. (The Army's version of the BQM-34A/S.)

CAPABILITIES: Maneuverability to 6 gs (pop-up, high-g level turn, dive, climb, serpentine profile). Can fly single profile or in formation.

MANUFACTURER: Teledyne Ryan

CONTROL SYSTEM: Can use ITCS (Navy 34A/S), Vega DTCS or DFCS. Manual control with radar position data, or automatic using position data from triangulation of distance measuring equipment.

STATUS: Operational, no further procurement

MILITARY USER: Air Force, Army,

AUGMENTATION: Active and passive radar, infrared, formation, ECM, flares, visual aids

OPERATING SITES: White Sands Missile Range

LAUNCH: Short rail or zero-length ground launcher using single jet-assisted-takeoff (JATO) bottle. Can be air launched from suitably modified aircraft. Navy has launched from ship.

CHARACTERISTICS:

Height: 6 feet, 8 inches

Length: 22 feet, 11 inches

Wing Span: 12 feet, 10 inches

Weight: Launch 2,300 pounds

Speed: Maximum 550 knots

Altitude: 100 to 61,000 feet

Endurance: 1 hour, 52 minutes

RECOVERY: Recoverable; two-stage parachute deployment. Land or sea (boat or helicopter).

POWERPLANT: Single Continental J-69-T-29 turbojet engine, produces 1,700 pounds of thrust at full throttle at sea level.

PURPOSE: Simulates subsonic aircraft threat. Used in test

TARGET: Aerial

DESIGNATION: MQM-33C

PURPOSE: Gunnery and missile training and evaluation program (National Guard) surface-to-air-missile.

COMMON NAME: Creeper

TYPE: Subscale, remotely controlled target

CAPABILITIES: Towing

MANUFACTURER: Northrop Corporation

CONTROL SYSTEM: Radio command guidance control, visual tracking required; can be controlled from land-based, ship-board or airborne equipment.

STATUS: Operational, replaces the MQM-33A and MQM-33B. Planned procurement until 40-millimeter weapons are phased out.

AUGMENTATION: Radar, infrared, banners

MILITARY USER: National Guard

CHARACTERISTICS:

Height: 2 feet, 6 inches

OPERATING SITES: National Guard Training Center

Length: 12 feet, 7 1/2 inches

Wing Span: 11 feet, 6 inches

LAUNCH: Ground-launched by jet-assisted-takeoff (JATO) bottle, catapult, rotary launcher or zero-length launcher.

Weight: Launch 400 pounds

Speed: 195 knots at sea level

RECOVERY: Parachute; operator release or automatic time release.

Altitude: 28,000 feet

Endurance: 55 minutes

POWERPLANT: One McCulloch model, four-cylinder, two-cycle, horizontally opposed, air-cooled engine which is designed to run at optimum rpm. Speed cannot be controlled after launch.

TARGET: Aerial

DESIGNATION: BQM-74C

gunnery training and weapons evaluation system.

COMMON NAME: Chukar II

TYPE: Subscale, remotely controlled, subsonic target

CAPABILITIES: Normal flight maneuvers with performance of 75° bank angle turns. Programmable for one of eight mission profiles when used for MSR scenario.

MANUFACTURER: Northrop

STATUS: Operational, future procurement

CONTROL SYSTEM: ITCS, PRCS, VEGA

MILITARY USER: Navy

AUGMENTATION: Radar, infrared, threat emitter, countermeasures, scoring, and tracking and visual aids.

OPERATING SITES: Atlantic Fleet Weapons Training Facility, Pacific Missile Range Facility, Pacific Missile Test Center, Mobile Sea Range (MSR)

CHARACTERISTICS:

Height: 2 feet, 3 3/4 inches

Length: 12 feet, 8 inches

Wing Span: 5 feet, 8 inches

Weight: Launch 451 pounds

Speed: Maximum Mach 0.75

Altitude: 50 to 35,000 feet

Endurance: 1 hour, 30 minutes

LAUNCH: Launched from zero-length ground launcher using dual jet-assisted-takeoff (JATO) bottles. Can be air launched from properly equipped aircraft (A-4, A-6E). Can also be shipboard launched.

RECOVERY: Deployment of parachute land or sea (boat or helicopter).

POWERPLANT: YJ400-WR-403 turbojet engine which produces 190 pounds of thrust at full throttle at sea level. Pressurized fuel tank in center of fuselage.

RELATED INFORMATION: Target improvements include altitude and airspeed performance. The target will be capable of Mach 0.88 in altitudes from 30 to 40,000 feet. An electromagnetic countermeasure capability is also under development.

PURPOSE: Cruise missile simulator for air-to-air, surface-to-air, and antiaircraft

TARGET: Aerial

DESIGNATION: AQM-37A

COMMON NAME: None

TYPE: Subscale, supersonic target

MANUFACTURER: Beech Aircraft

STATUS: Operational

MILITARY USER: Navy

OPERATING SITES: Atlantic Fleet Weapons Training Facility, Pacific Missile Test Center

LAUNCH: Air launch, subsonic launch from a land or carrier based A-4, A-6 or F-4 aircraft.

RECOVERY: Nonrecoverable; some Army versions have a parachute recovery system.

POWERPLANT: Two chamber liquid propellant variable thrust rocket motor.

PURPOSE: Aircraft and missile threat simulations, weapon systems evaluation and personnel training.

CAPABILITIES: Presents wide variety of profiles from 1,000 to 70,000 feet.

CONTROL SYSTEM: Controlled by self-contained, preset program guidance systems using ailerons for roll control and canards for pitch control; automatic destruct systems.

AUGMENTATION: Passive and active radar, infrared, scoring, tracking aids

CHARACTERISTICS:

Height: 2 feet, 2 inches

Length: 14 feet

Wing Span: 3 feet, 3 1/2 inches

Weight: Launch 565 pounds maximum

Speed: Maximum Mach 2.0

Altitude: Maximum 70,000 feet

Endurance: 8 minutes, powered

TARGET: Aerial

DESIGNATION: AQM-37C	receiver/decoder for command control and a telemetry transmitter for target performance data.
COMMON NAME: Challenger	
TYPE: Subscale, supersonic target	AUGMENTATION: Active radar, scoring, tracking aids
MANUFACTURER: Beech Aircraft	CHARACTERISTICS:
STATUS: Operational; updated version of AQM-37A, planned future procurement.	Height: 2 feet, 2 inches
MILITARY USER: Navy	Length: 14 feet
OPERATING SITES: Pacific Missile Test Center, Atlantic Fleet Weapons Training Facility	Wing Span: 3 feet, 3 1/2 inches
	Weight: 581 pounds
	Speed: Maximum Mach 3.0
	Altitude: Maximum 80,000 feet
	Endurance: Not Available
LAUNCH: Air launch, subsonic launch from F-4 aircraft.	RELATED INFORMATION: Efforts are underway to design a kit which increases the performance envelope of the AQM-37C (EP) to Mach 4.0 at 100,000 feet.
RECOVERY: Nonrecoverable	
POWERPLANT: Powered by a liquid bipropellant engine.	
PURPOSE: Aircraft and missile threat simulations, weapon systems evaluation and personnel training.	
CAPABILITIES: Course correcting turns, dive angles of 15 to 65° and dive pullout.	
CONTROL SYSTEM: Digital, preselectable via flight control panel, incorporates a UHF	

TARGET: Aerial

DESIGNATION: MQM-8ER

CONTROL SYSTEM: Programmed Command Guidance Computer (CGC) control system, UHF, onboard altimeter for low altitudes.

COMMON NAME: VANDAL ER

TYPE: Subscale, supersonic low altitude target

AUGMENTATION: Emitter, scoring, tracking aids

MANUFACTURER: Bendix Corporation

CHARACTERISTICS:

Height: 2 feet, 1 inch

STATUS: Operational, planned procurement

Length: 25 feet

Wing Span: Not applicable

MILITARY USER: Navy

Weight: Launch 3,860 pounds

OPERATING SITES: Pacific Missile Test Center

Speed: Maximum Mach 2.15

Altitude: 50 to 600 feet

Endurance: Not available

LAUNCH: Launched from a land-based modified Talos launcher by a solid propellant booster.

RECOVERY: Nonrecoverable

POWERPLANT: Ramjet engine

PURPOSE: Simulates threat of midcourse and terminal phase of an attacking anticruise missile.

CAPABILITIES: Can be flown at low altitudes (50 feet). Extended fuselage accommodates additional fuel for prolonged flights.

TARGET: Aerial

DESIGNATION: MQM-8G

COMMON NAME: VANDAL

TYPE: Subscale, supersonic low
to medium altitude target

MANUFACTURER: Bendix Corporation

STATUS: Operational, planned
procurement

MILITARY USER: Navy

OPERATING SITES: White Sands
Missile Range, Pacific Missile
Test Center, NASA/Wallops

LAUNCH: Launched from land-
based modified Talos launcher
by a solid propellant booster.

RECOVERY: Nonrecoverable

POWERPLANT: Ramjet engine

PURPOSE: Simulates threat of
midcourse and terminal phase
of attacking anticruise mis-
sile.

CAPABILITIES: Variety of flight
trajectories, cruise alti-
tudes, descent angles, ter-
minal speeds, and terminal
homing.

CONTROL SYSTEM: Programmed Com-
mand Guidance Computer (CGC)
control system, UHF. Has on-
board radar altimeter for
altitudes below 5,000 feet.

AUGMENTATION: Emitter, scoring,
tracking aids

CHARACTERISTICS:

Height: 2 feet, 4 inches

Length: 21 feet, 2 inches

Wing Span: Not applicable

Weight: Launch 3,500 pounds

Speed: Maximum Mach 1.85
(low-speed version) or Mach
2.8 (high-speed version)

Altitude: Maximum 70,000 feet

Endurance: Not available

TARGET: Aerial

DESIGNATION: MQM-8X

AUGMENTATION: Radar, tracking
aids

COMMON NAME: Fleet VANDAL

CHARACTERISTICS:

TYPE: Subscale, supersonic mid-
altitude target

Height: 2 feet, 4 inches

Length: 21 feet, 2 inches

MANUFACTURER: Bendix Corpora-
tion

Wing Span: Not applicable

Weight: Launch 3,500 pounds

STATUS: Operational, planned
procurement

Speed: Maximum Mach 2.8

Altitude: Maximum 70,000 feet

MILITARY USER: Navy

Endurance: Not available

OPERATING SITES: Pacific Mis-
sile Test Center

LAUNCH: Launched from land-
based modified Talos launcher
by a solid propellant booster.

RECOVERY: Nonrecoverable

POWERPLANT: Ramjet engine

PURPOSE: Simulates threat of
midcourse and terminal phase
of attacking anticruise mis-
sile.

CAPABILITIES: Operates at
40,000- to 70,000-foot alti-
tudes (lacks payload).

CONTROL SYSTEM: Programmed Com-
mand Guidance Computer (CGC)
control system, UHF.

TARGET: Aerial

DESIGNATION: BQM-126A

COMMON NAME: BQM-PI

TYPE: Subscale, remotely controlled, subsonic target

MANUFACTURER: Beech Aircraft

STATUS: Developmental; replaces the BQM-34A/S. Currently being flight tested; availability planned for FY-90.

MILITARY USER: Navy

OPERATING SITES: Atlantic Fleet Weapons Training Facility, Pacific Missile Range Facility, Pacific Missile Test Center, Mobile Sea Range

LAUNCH: Surface launched from a zero-length, rocket-assisted-takeoff (RATO) launcher or air launched from an A-6, F/A-18, P-3, or DC-130 aircraft.

RECOVERY: Land or sea (helicopter or surface boat)

POWERPLANT: Single turbojet engine which produces 899 pounds of thrust.

PURPOSE: Provides air-to-air and surface-to-air training; test and evaluation of weapon systems.

CAPABILITIES: In addition to normal flight maneuvers, can perform at a minimum altitude of 20 feet when using a radar altimeter for altitude control.

CONTROL SYSTEM: Onboard ITCS or Extended Area Tracking System (EATS) using a receiver repeater responder unit, PRTCS, VEGA.

AUGMENTATION: Radar, infrared, emitter, countermeasures, IRCM, scoring, and tracking and visual aids.

CHARACTERISTICS:

Height: 2 feet

Length: 18 feet, 1/2 inch

Wing Span: 10 feet

Weight: Not available

Speed: Maximum Mach 0.9

Altitude: Maximum 40,000 feet

Endurance: 40 minutes at Mach 0.8, 15,000 feet

TARGET: Aerial

DESIGNATION: AQM-81N

AUGMENTATION: Point-source radar, scalar-scoring system, tracking aids

COMMON NAME: Firebolt

TYPE: Subscale, high-altitude, high-speed target

CHARACTERISTICS:

Height: 2 feet, 2 inches

Length: 17 feet, 1 inch

MANUFACTURER: Teledyne Ryan

Wing Span: 3 feet, 4 inches

STATUS: Phased out in FY-85; planned production canceled.

Weight: Not available

Speed: Maximum Mach 4.0

MILITARY USER: Navy

Altitude: Maximum 100,000 feet

Endurance: Not available

OPERATING SITES: Pacific Missile Test Center

LAUNCH: Air launch at supersonic speed.

RECOVERY: Parachute recovery on land or sea (helicopter or boat).

POWERPLANT: Hybrid (liquid oxidizer, solid fuel) rocket engine.

PURPOSE: Simulates supersonic aircraft.

CAPABILITIES: Not available

CONTROL SYSTEM: Preprogrammed or command control, ITCS.

TARGET: Aerial

DESIGNATION: AQM-81A

part of flight test program. Vehicle also capable of S and 180° turns in horizontal plane and altitude changes in vertical plane.

COMMON NAME: Firebolt

TYPE: Subscale, high-altitude, high-speed target

CONTROL SYSTEM: Automatic flight control system provides vehicle control and maneuver functions. Maneuvers are pre-programmed and can be initiated automatically or upon ground control, DTCS.

MANUFACTURER: Teledyne Ryan

STATUS: Developmental, planned procurement

AUGMENTATION: Point-source radar, scoring

MILITARY USER: Air Force

OPERATING SITES: Tyndall Air Force Base, Eglin Air Force Base

CHARACTERISTICS:

Height: 1 foot, 1 inch in diameter

LAUNCH: Air launched from A-4 aircraft (future F-15 aircraft).

Length: 17 feet

Wing Span: 3 feet, 4 inches

RECOVERY: Parachute (land, water or midair) via CH-3 midair retrieval system (MARS) equipped helicopter.

Weight: Launch 1,240 pounds

Speed: Mach 1.2 to 4.0

Altitude: Maximum 100,000 feet

POWERPLANT: Hybrid rocket consisting of a solid fuel polybutadiene and polymethyl methacrylate and a liquid oxidizer (inhibited red fuming nitric acid-IFRNA).

Endurance: 5 minutes at Mach 3

PURPOSE: Advance air-to-air missile test and evaluations.

CAPABILITIES: Maneuvers of between 5 gs at 34,000 feet and 1.15 gs at 90,000 feet are

TARGET: Aerial

DESIGNATION: MQM-107A

COMMON NAME: Streaker

TYPE: Subscale, subsonic, variable speed training target

MANUFACTURER: Beech Aircraft

STATUS: Operational

MILITARY USER: Army

OPERATING SITES: White Sands Missile Range

LAUNCH: Zero-length surface launcher using jet-assisted-takeoff (JATU) booster.

RECOVERY: Land or water via parachute; initiated by command, loss of RF carrier or of electrical power.

POWERPLANT: Teledyne CAE J402-CA-700 modified Harpoon turbojet engine rated at 640 pounds thrust at sea level static condition.

PURPOSE: Provides training support for present and future air defense weapon systems, system development, and quality assurance.

CAPABILITIES: Adaptable, transportable, reliable, modular construction lends itself to reconfiguration for special requirements.

CONTROL SYSTEM: Analog or digital guidance and control. Provides for both ground control and preprogrammed flight. Flight control developments include a terrain-following guidance capability for low altitude profiles, VEGA, TICS.

AUGMENTATION: Radar, infrared, banner, ECM

CHARACTERISTICS:

Height: 4 feet, 10 inches

Length: 16 feet, 10 inches (standard) 18 feet, 1 inch (extended)

Wing Span: 9 feet, 10 inches

Weight: Launch 1,014 pounds including booster

Speed: 500 knots true air speed

Altitude: Maximum 40,000 feet

Endurance: Approximately 1 hour, 30 minutes

TARGET: Aerial

DESIGNATION: MQM-107B

(2) altitude and g level held constant at varying airspeeds.

COMMON NAME: Streaker

TYPE: Subsonic, subscale variable speed training target

CONTROL SYSTEM: Onboard flight and control system (autopilot) in conjunction with airborne command and control unit; GRDCUS, VEGA, DTCS/TTCS.

MANUFACTURER: Beech Aircraft

AUGMENTATION: Radar, infrared, banner, ECM, visual aids

STATUS: Operational

MILITARY USER: Army, Air Force

CHARACTERISTICS:

Height: 4 feet, 10 inches

OPERATING SITES: White Sands Missile Range, Tyndall Air Force Base

Length: 18 feet, 1 inch

Wing Span: 9 feet, 10 inches

LAUNCH: Zero-length surface launcher using jet-assisted-takeoff (JATO) booster.

Weight: Launch 1,090 pounds

Speed: 525 knots

RECOVERY: Two-stage parachute system (land or water) initiated by command, loss of RF carrier, or loss of electrical power.

Altitude: Maximum 40,000 feet

Endurance: Approximately 3 hours

POWERPLANT: TRI 60-2, Model 074 turbojet engine with 830 pounds thrust at static level.

RELATED INFORMATION: The MQM-107B has evolved from efforts to improve the MQM-107A. Further improvements are being recommended and tested and will be demonstrated in the MQM-107C and MQM-107EP.

PURPOSE: Supports testing for air-to-air or surface-to-air weapon system.

CAPABILITIES: Performs constant g maneuvers at any level up to 6 gs. Two modes: (1) air-speed and g level held constant at varying altitudes or

TARGET: Aerial

DESIGNATION: AQM-127A

AUGMENTATION: Radar, emitter,
scoring, and tracking and
visual aids.

COMMON NAME: Missile target

TYPE: Subscale, supersonic, low-
altitude, missile target

CHARACTERISTICS:

Height: 1 foot, 9 1/4 inches
(Measurement includes fins.)

MANUFACTURER: Martin Marietta
Corporation

Length: 17 feet, 11 1/2 inches

Wing Span: Not applicable

STATUS: Developmental

Weight: 2,445 pounds

MILITARY USER: Navy

Speed: Maximum Mach 2.5

Altitude: 30 feet

OPERATING SITES: Atlantic Fleet
Weapons Training Facility,
Pacific Missile Test Center

Endurance: Not available

LAUNCH: Subsonic launch from
aircraft (A-6, DC-130, F-4,
F/A-18, P-3, QF-4N/S) at 1,000
feet altitude.

RECOVERY: Parachute recovery
land or sea (boat or helicop-
ter).

POWERPLANT: Not available

PURPOSE: Supports weapon system
testing and fleet training
requirements.

CAPABILITIES: Full payload
capability.

CONTROL SYSTEM: Command control
system to be compatible with
VTCS, ITCS and EATS.

TARGET: Aerial

DESIGNATION: Ballistic Aerial
Target System

AUGMENTATION: Infrared

COMMON NAME: BATS

CHARACTERISTICS:

TYPE: Subscale, nonmaneuverable
short range missile target

Height: 2 feet, 6 inches in
diameter

Length: 16 feet, 1/2 inch

MANUFACTURER: Brunswick

Wing Span: 3 feet, 6 inches
(fin span)

STATUS: Operational, being
replaced by Radio Controlled
Miniature Aerial Target

Weight: No available

Speed: Maximum 550 knots

Altitude: Maximum 8,000 feet

MILITARY USER: Marine Corps

Endurance: Maximum 47 seconds

OPERATING SITES: Cherry Point,
North Carolina, Camp
Pendleton, California

LAUNCH: Ground

RECOVERY: Nonrecoverable

POWERPLANT: Two to five 2.75
rocket motors; two jet engine
starter cartridges as sus-
tainers.

PURPOSE: Personnel training and
testing of short range defense
system.

CAPABILITIES: Tow and medium
altitude flights. Can "pop-up"
and dive.

CONTROL SYSTEM: Not applicable

TARGET: Aerial

DESIGNATION: QUH-1

COMMON NAME: Huey

TYPE: Full-scale, rotary winged
target

MANUFACTURER: Bell, Inc., (drone
equipment kaman Aerospace)

STATUS: Operational

MILITARY USER: Army

OPERATING SITES: White Sands
Missile Range

LAUNCH: Ground

RECOVERY: Ground

POWERPLANT: Havco Lycoming
T-53-L-11 or T-53-L-13 turbine
engine.

PURPOSE: Weapons and missile
testing.

CAPABILITIES: Vertical maneu-
ver, lateral maneuver, race
track.

CONTROL SYSTEM: Vega airborne
equipment and automatic flight
control system components.

AUGMENTATION: Flares, chaff

CHARACTERISTICS:

Height: 17 feet, 3 inches

Length: 52 feet, 10 inches

Wing Span: 44 feet (rotary
diameter)

Weight: Maximum 9,500 pounds
(with fuel), average 7,500
pounds (with fuel)

Speed: 100 knots

Altitude: 8,000 to 10,000 feet
mean sea level

Endurance: 2 hours

TARGET: Aerial

DESIGNATION: QH-50

COMMON NAME: DASH (Drone Anti-submarine Helicopter)

TYPE: Subscale, remotely controlled, rotary winged, coaxial helicopter

MANUFACTURER: Originally developed by U.S. Navy (Gyrodyne)

STATUS: Operational

MILITARY USER: Army, Navy

OPERATING SITES: Naval Weapons Center, White Sands Missile Range

LAUNCH: Ground takeoff

RECOVERY: Ground landing

POWERPLANT: Boeing Model T50-B-12 free turbine rated at 300 horsepower at 6000 rpm, sea level.

PURPOSE: Simulates helicopter threat, IRCM tests and test platform.

CAPABILITIES: The remote control system's memory function allows the drone to operate in a hover mode using the last received altitude and heading commands.

CONTROL SYSTEM: Remote control consists of an airborne 4-axis stabilization system and a receiver and decoder unit. The 4-axis system stabilizes the vehicle in pitch, roll, yaw, and altitude. A vertical gyro provides longitudinal (pitch) and lateral (roll) stability and a directional gyro provides yaw (heading) stability. The altitude axis incorporates a barometric altitude axis sensing device. Also compatible with VTCS and TTCS.

AUGMENTATION: As required

CHARACTERISTICS:

Height: 9 feet, 8 1/2 inches

Length: 7 feet, 7 1/2 inches

Wing Span: 20 feet (blades)

Weight: (Payload) 1,000 pounds

Speed: 0 to 80 knots

Altitude: Service - 16,000 feet. Hover - 6,500 feet. Limited to 0 to 1,000 feet above launch site.

Endurance: 1 hour, 45 minutes at 55 knots

RELATED INFORMATION: The QH-50 is an unmanned helicopter with the lower transmission casting forming the main portion of the fuselage. Attached to the

casting are the four supporting struts for the sled-type landing gear, the two lower aft fuselage tubes, and the launcher mechanism.

The avionic equipment is mounted on a vertical aluminum honeycomb sandwich structure, which is supported by four tubular members inserted into sockets on the transmission housing. The honeycomb panel and tubular members form the aft fuselage frame where the fuel frame and fuel tank are nested for support.

A two-stage gear reduction, generator drive, rotary actuator drive, lubricating system, and two coaxial rotor drive shafts comprise the rotor transmission system.

The rotor system consists of two 20-foot diameter, two-bladed, semirigid counter-rotating coaxial rotors.

The cylindrical fuel tank has a 52-gallon capacity. The tank's axis is placed laterally on the drone.

TARGET: Land

DESIGNATION: QLT-1C

steering, accelerating, and
breaking functions.

COMMON NAME: Mobile Land Target

AUGMENTATION: Radar, tracking
aids

TYPE: Remotely controlled,
multiuse, moving target plat-
form

CHARACTERISTICS:

MANUFACTURER: Sandais

Height: 6 feet, 7 inches

Length: 12 feet

STATUS: Operational, no further
procurement planned

Width: 6 feet, 5 inches

Weight: 1,500 pounds

MILITARY USER: Navy, Army

Speed: Maximum 55 mph

Altitude: Not applicable

OPERATING SITES: Atlantic Fleet
Training Facility, Naval Wea-
pons Center, Yuma Proving
Ground

Endurance: Not applicable

LAUNCH: Not applicable

RELATED INFORMATION: The QLT-1C
has a lightweight tubular
frame with a modified running
gear, an automatic transmis-
sion/transaxle, and a 10-
gallon fuel tank. The QLT-1C
averages 30 mpg.

RECOVERY: Not applicable

POWERPLANT: Volkswagon engine

A typical QLT-1C range is
comprised of a central control
tower where the remote control
operator can observe the full
length of the operating track.
The track runs on a line per-
pendicular to the control
tower at a distance of 2,500
to 4,000 feet. The length of
the track is typically 3,000
to 6,000 feet with a width of
300 to 500 feet. The target
contains two rotation beacon
lights: a white one for in-
forming the remote control
operator that the engine is
running, and a red one to warn
the attacking aircrew that the
target is not ready for an
attack.

PURPOSE: Train aircrews in air-
to-surface weapons delivery
techniques.

CAPABILITIES: Can simulate
several highly maneuverable
vehicles such as dune buggies.

CONTROL SYSTEM: UHF signals
received by an AN/DRW-29 re-
ceiver decoder; electromechan-
ical actuators control gear
shifting, proportional

TARGET: Land

DESIGNATION: M-151

CHARACTERISTICS:

COMMON NAME: Jeep

Height: 5 feet, 10 inches

Length: 10 feet, 11 inches

TYPE: Remotely controlled vehicle

Width: 5 feet, 2 inches

Weight: 2,273 pounds

MANUFACTURER: Not available

Speed: 66 mph

STATUS: Operational

Altitude: Not applicable

Endurance: Not applicable

MILITARY USER: Air Force

OPERATING SITES: Eglin Air Force Base

LAUNCH: Not applicable

RECOVERY: Not applicable

POWERPLANT: Ford, 4-cylinder, water cooled engine; standard transmission.

PURPOSE: Presents representative threat of moving ground targets for armament effectiveness and guidance control testing.

CAPABILITIES: Not available

CONTROL SYSTEM: UHF

AUGMENTATION: Not available

TARGET: Land

DESIGNATION: M-135

CHARACTERISTICS:

COMMON NAME: Truck

Height: 8 feet, 9 inches

TYPE: Remotely controlled vehicle

Length: 22 feet, 5 inches

Width: 6 feet, 9 inches

MANUFACTURER: Not available

Weight: 12,330 pounds

Speed: 58 mph

STATUS: Operational

Altitude: Not applicable

Endurance: Not applicable

MILITARY USER: Air Force

OPERATING SITES: Eglin Air Force Base

LAUNCH: Not applicable

RECOVERY: Not applicable

POWERPLANT: GMC, 6-cylinder, water cooled engine; automatic transmission.

PURPOSE: Presents representative threat of moving ground targets for armament effectiveness and guidance control testing.

CAPABILITIES: Not available

CONTROL SYSTEM: UHF

AUGMENTATION: Not available

TARGET: Land

DESIGNATION: M-114

CHARACTERISTICS:

COMMON NAME: Armored Personnel
Carrier

Height: 7 feet, 6 inches

Length: 14 feet, 7 inches

TYPE: Remotely controlled vehicle

Width: 7 feet, 7 inches

Weight: 15,000 pounds

MANUFACTURER: Not available

Speed: 34 mph

Altitude: Not applicable

STATUS: Operational

Endurance: Not applicable

MILITARY USER: Air Force

OPERATING SITES: Eglin Air
Force Base, Utah Test and
Training Range

LAUNCH: Not applicable

RECOVERY: Not applicable

POWERPLANT: GMC, V-8, water
cooled engine; automatic
transmission.

PURPOSE: Presents representative
threat of moving ground targets
for armament effectiveness
and guidance control
testing.

CAPABILITIES: Not available

CONTROL SYSTEM: UHF

AUGMENTATION: Not available

TARGET: Land

DESIGNATION: M-59

CHARACTERISTICS:

COMMON NAME: Armored Personnel
Carrier

Height: 8 feet, 10 inches

Length: 18 feet

TYPE: Remotely controlled vehicle

Width: 10 feet, 4 inches

Weight: 41,800 pounds

MANUFACTURER: Not available

Speed: Not available

Altitude: Not applicable

STATUS: Operational

Endurance: Not applicable

MILITARY USER: Air Force

OPERATING SITES: Eglin Air
Force Base

LAUNCH: Not applicable

RECOVERY: Not applicable

POWERPLANT: Two GMC, 6-cylinder,
water cooled engines; auto-
matic transmission.

PURPOSE: Presents representative
threat of moving ground tar-
gets for armament effective-
ness and guidance control
testing.

CAPABILITIES: Not available

CONTROL SYSTEM: UHF

AUGMENTATION: Not available

TARGET: Land

DESIGNATION: M-53

COMMON NAME: Self-Propelled
Artillery

TYPE: Remotely controlled
vehicle

MANUFACTURER: Not available

STATUS: Operational

MILITARY USER: Air Force

OPERATING SITES: Eglin Air
Force Base, Utah Test and
Training Range

LAUNCH: Not applicable

RECOVERY: Not applicable

POWERPLANT: Continental, 12-
cylinder, air cooled engine;
cross drive transmission.

PURPOSE: Presents representative
threat of moving ground target
for armament effectiveness and
guidance control testing.

CAPABILITIES: Not available

CONTROL SYSTEM: UHF

AUGMENTATION: Not available

CHARACTERISTICS:

Height: 11 feet, 8 inches

Length: 33 feet, 6 inches

Width: 11 feet, 9 inches

Weight: 96,000 pounds

Speed: 30 mph

Altitude: Not applicable

Endurance: Not applicable

TARGET: Land

DESIGNATION: M-48

COMMON NAME: Tank

TYPE: Remotely controlled vehicle

MANUFACTURER: Chrysler Corporation

STATUS: Operational

MILITARY USER: Air Force

OPERATING SITES: Eglin Air Force Base, Utah Test and Training Range

LAUNCH: Not applicable

RECOVERY: Not applicable

POWERPLANT: Continental, 12-cylinder, air cooled engine; cross drive transmission.

PURPOSE: Presents representative threat of moving ground target for armament effectiveness and guidance control testing.

CAPABILITIES: Not available

CONTROL SYSTEM: UHF

AUGMENTATION: Not available

CHARACTERISTICS:

Height: 10 feet, 7 inches

Length: 24 feet, 5 inches

Width: 11 feet, 11 inches

Weight: 98,125 pounds

Speed: 28 mph

Altitude: Not applicable

Endurance: Not applicable

TARGET: Land

DESIGNATION: M-47

CHARACTERISTICS:

COMMON NAME: Tank

Height: 10 feet, 11 inches

Length: 20 feet, 10 inches

TYPE: Remotely controlled vehicle

Width: 11 feet, 6 inches

Weight: 92,883 pounds

MANUFACTURER: Detroit Tank
Plant, American Locomotive Co.

Speed: 30 mph

Altitude: Not applicable

STATUS: Operational

Endurance: Not applicable

MILITARY USER: Air Force, Army

OPERATING SITES: Eglin Air
Force Base, White Sands
Missile Range, Utah Test and
Training Range

LAUNCH: Not applicable

RECOVERY: Not applicable

POWERPLANT: Continental, 12-
cylinder, air cooled engine;
cross drive transmission.

PURPOSE: Presents representative
threat of moving ground target
for armament effectiveness and
guidance control testing.

CAPABILITIES: Not available

CONTROL SYSTEM: UHF, MTCAS

AUGMENTATION: Not available

TARGET: Land

DESIGNATION: M-41

CHARACTERISTICS:

COMMON NAME: Tank

Height: 9 feet, 4 inches

Length: 20 feet, 10 inches

TYPE: Remotely controlled vehicle

Width: 10 feet, 6 inches

Weight: 51,800 pounds

MANUFACTURER: General Motors

Speed: 45 mph

STATUS: Operational

Altitude: Not applicable

Endurance: Not applicable

MILITARY USER: Air Force

OPERATING SITES: Eglin Air Force Base

LAUNCH: Not applicable

RECOVERY: Not applicable

POWERPLANT: Continental, 6-cylinder, air cooled engine; cross drive transmission.

PURPOSE: Presents representative threat of moving ground target for armament effectiveness and guidance control testing.

CAPABILITIES: Not available

CONTROL SYSTEM: UHF

AUGMENTATION: Not available

TARGET: Seaborne

DESIGNATION: QST-33

PURPOSE: Threat simulator of any small boat or ship.

COMMON NAME: SEPTAR (Seaborne Powered Target)

CAPABILITIES: High degree of maneuverability comparable to a PT boat; manual or remote control operation.

TYPE: Powered fiberglass boat; medium to high-speed surface target

CONTROL SYSTEM: Radio control; remote control equipment can be located on land, aboard other ships or boats, or in aircraft. Command signals are received, decoded and distributed by an AN/DRW-29 radio receiver.

MANUFACTURER: Purchased to Navy specifications

STATUS: Operational, planned procurement

AUGMENTATION: Passive radar, and tracking and visual aids.

OPERATING SITES: Atlantic Fleet Weapons Training Facility; Naval Air Test Center; Pacific Missile Range Facility; Pacific Missile Test Center; and Subic Bay, Philippines

CHARACTERISTICS:

Length: 18 feet

Beam: 7 feet, 4 inches

Freeboard: 1 foot, 6 inches

Draft: 1 foot

Weight: 3,650 pounds

Speed: 20 to 40 knots

Endurance: 4 to 6 hours without refueling

LAUNCH: Transported from port to operating area.

RECOVERY: Transported from operating area to port.

POWERPLANT: Mercury Marine - inboard gasoline V-8 (230 horsepower) engine with the shaft coupled to a stern-mounted out drive propeller assembly.

TARGET: Seaborne

DESIGNATION: QST-35

COMMON NAME: SEPTAR (Seaborne
Powered Target)

TYPE: Powered fiberglass boat,
medium to high-speed surface
target

MANUFACTURER: Purchased to Navy
specifications

STATUS: Operational, planned
procurement

MILITARY USLR: Navy

OPERATING SITES: Atlantic Fleet
Weapons Training Facility,
Naval Air Test Center, Pacific
Missile Test Center

LAUNCH: Transported from
port to operating area.

RECOVERY: Transported from
operating area to port.

POWERPLANT: 5 Mercury Marine
engines (340 horsepower each)

PURPOSE: Simulates threat posed
by patrol boats having missile
firing ability.

CAPABILITIES: Heading changes,
engine throttles for speed
changes, and augmentation.

CONTROL SYSTEM: Remote control
system (AN/DRW-29 UHF receiver/decoder) receives command
functions from a transmitter
and distributes those commands
to the autopilot.

AUGMENTATION: Generally tai-
lored to operation support;
radar, scoring, thrust emit-
ters, rocket launchers, strobe
light.

CHARACTERISTICS:

Length: 55 feet

Beam: 14 feet

Freeboard: 3 feet

Draft: 2 feet, 5 inches

Weight: Not available

Speed: Maximum safe speed is
34 knots in very smooth sea
state. Safe speed decreases
to 8 to 10 knots as sea
state builds to 3 or 4.

Endurance: 234 miles or 18
hours at 13 knots - Mod 0.
165 miles or 11 hours at 15
knots - Mod 1.

TARGET: Seaborne

DESIGNATION: Ship Hulk

systems, flooding pumps, identification beacons, cameras, and augmentation devices.

COMMON NAME: Hulk

CONTROL SYSTEM: Not applicable

TYPE: Inactive full-size destroyers or destroyer escorts

AUGMENTATION: Tailor-made to user's request; accommodations based on availability and power requirements.

MANUFACTURER: Navy (inactive Fleet list)

STATUS: Operational

CHARACTERISTICS:

MILITARY USER: Navy

Length: 376 feet, 6 inches

Beam: 39 feet, 6 inches

OPERATING SITES: Atlantic Fleet Weapons Training Facility, Naval Air Test Center, Pacific Missile Test Center

Masthead: 80 feet above waterline

Draft: 18 feet

LAUNCH: Towed by tugboats from harbor to operating area.

Freeboard aft: 8 feet above waterline

Freeboard midship: 10 feet above waterline

RECOVERY: Towed by tugboats from operating area to harbor.

Freeboard forward: 20 feet above waterline

POWERPLANT: Not applicable

Displacement: 2,050 tons

PURPOSE: Provides antiship weapon system test programs with an actual combat-type target ship.

CAPABILITIES: Equipped with a portable electrical distribution system to provide power to such systems as anchor windlass, anchor lights, utility lighting, remote-control

TARGET: Seaborne

DESIGNATION: Mk 42 Mod 0

CHARACTERISTICS:

COMMON NAME: FAST (Floating at
Sea Target)

Height: 5 feet, 5 inches

Width: 5 feet, 5 inches

TYPE: Unpowered seaborne target

Length: Not applicable

Weight: 140 pounds

MANUFACTURER: Purchased to Navy
specifications

Volume: 191 cubic feet

Draft: 6 inches

STATUS: Operational, future
procurement

Beam: Not applicable

Freeboard: Not applicable

MILITARY USER: Navy

Speed: Not applicable

Altitude: Not applicable

OPERATING SITES: Deployed

LAUNCH: Ship

RECOVERY: Ship

PURPOSE: The FAST is a 20-sided polygon (icosahedron) approximately 6 feet in diameter. It consists of 20 equilateral triangular reflector panels. Each reflector has nine integral corner reflectors coated with conductive paint that provides a radar reflective characteristic simulating the size of a destroyer or frigate-type vessel.

AUGMENTATION: Scoring system
being developed.

TARGET: Seaborne

DESIGNATION: T-459

CHARACTERISTICS:

COMMON NAME: T-Boat

Length: 64 feet, 10 inches

Beam: 12 to 14 feet

TYPE: Remotely controlled vehicle

Freeboard: 4 to 6 feet

Draft: 2 feet, 10 inches to 6 feet, 10 inches

MANUFACTURER: Not available

Speed: 8 knots

STATUS: Operational

MILITARY USER: Air Force

OPERATING SITES: Eglin Air Force Base

LAUNCH: Water

RECOVERY: Water recovery

POWERPLANT: Caterpillar, 6-cylinder engine

PURPOSE: Presents representative seaborne target for guidance and control testing.

CAPABILITIES: Not available

CONTROL SYSTEM: UHF

AUGMENTATION: Not available

TARGET: Seaborne

LXCALIBUR: A manned, 32-foot high performance ocean-going boat that can cruise at 55 knots. The Excalibur has many augmentation possibilities. Its prime use is as a high-speed target to test radar-tracking capabilities.

TARGET: Tow

DESIGNATION: TDU-32A/B and TDU-32/B

targets are towed approximately 1,800 feet behind the towing aircraft. Efforts are underway to coat the TDU-32A/B with highly reflective paint to be used as a laser target.

COMMON NAME: Banner

TYPE: Aerial banner tow targets

AUGMENTATION: Not applicable

MANUFACTURER: Purchased to Navy specifications

CHARACTERISTICS:

STATUS: Operational, planned procurement of the TDU-32A/B; no further procurement of TDU-32/B.

Height: Not applicable

Width: 7 feet, 6 inches

Length: 40 feet (plus 60 feet tow attachment cables)

MILITARY USER: Navy

Weight: 23 pounds

OPERATING SITES: Pacific Missile Test Center

Speed: Maximum towing velocity 250 knots

Altitude: Not applicable

LAUNCH: Launched from runway by standard drag-takeoff procedures. Tow aircraft: A-4, A-6, A-7, F-4, F-14, F/A-18, T-2.

RECOVERY: Accomplished by dropping the target in any clear land area.

PURPOSE & DESCRIPTION: The TDU-32A/B and TDU-32/B are used for air-to-air and surface-to-air gunnery training. The targets are rectangular in shape and are white with a 12-inch orange border and a 48-inch orange bull's-eye. The TDU-32/B is made of non-reflective nylon fabric, while the TDU-32A/B is 90 percent radar reflective. The

TARGET: Tow

DESIGNATION: TDU-10/B

CHARACTERISTICS:

COMMON NAME: Aerial Tow

Height: Not applicable

Width: 5 feet, 2 inches

TYPE: Aerial tow target

Length: 18 feet

MANUFACTURER: Purchased to Navy specifications

Weight: 200 pounds

Speed: Maximum towed speed
Mach 0.6

STATUS: Operational, no further procurement

Altitude: 25,000 feet

MILITARY USER: Navy (Air Force target)

OPERATING SITES: VC-13 Miramar, California

LAUNCH: Towed by an A-4 aircraft

RECOVERY: Nonrecoverable

PURPOSE & DESCRIPTION: A low-cost target used for basic air-to-air and surface-to-air gunnery. The target consists of four wings bolted to a keel, a nose section which includes a nose cone and an adjustable ballast weight, a bridle assembly, and a radar reflector. The wings are constructed of a paper honeycomb core surrounded by a wood frame and covered by an aluminum alloy skin bonded to the core.

AUGMENTATION: Radar

TARGET: Tow

DESIGNATION: TDU-34/A

AUGMENTATION: Radar

COMMON NAME: Tow Target

CHARACTERISTICS:

TYPE: Aerial tow target

Height: Not applicable

Width: 2 feet, 1 inch

MANUFACTURER: Purchased to Navy
specifications

Length: 9 feet, 4 inches

Weight: 75 pounds

STATUS: Operational

Speed: Maximum tow speed Mach
0.9

MILITARY USER: Navy

Altitude: 35,000 feet

OPERATING SITES: Pacific
Missile Test Center, Atlantic
Fleet Weapons Training
Facility

LAUNCH: Air launch, towed by
A-4, A-6, F-4 using an RMK-
19/A47U-3 or RMK-31/A47U-4
towing and launching reel.

RECOVERY: Not available

PURPOSE & DESCRIPTION: Primary
use is for air-to-air missiles
and gunnery training. The
target is basically a passive
radar target with corner
reflections located in the
nose and tail. An Engineering
Change Proposal (ECP-1) is
currently underway to augment
the target with a 3- by 12-
foot string banner, Ram Air
Turbine (RAT) for electrical
power, jet engine exhaust sim-
ulator, transmitter encoder,
receiver decoder scoring set,
and a radar transmitting set.

TARGET: Tow

DESIGNATION: LUFAT

CHARACTERISTICS:

COMMON NAME: Not applicable

Height: Not applicable

TYPE: Low flying aerial target

Width: 2 feet, 6 inches in diameter

MANUFACTURER: Not available

Length: 10 feet

STATUS: Operational

Weight: 320 pounds

MILITARY USER: Navy

Speed: Maximum 500 knots indicated air speed (IAS)

OPERATING SITES: Naval Air Test Center

Altitude: Not available

LAUNCH: Drag-takeoff method, use of reeling machine launcher.

RECOVERY: Runway landing

PURPOSE & DESCRIPTION: A foam and glasslike composite target designed to represent a cruise missile in a head-on aspect. Used as a radar target, for training personnel, and for evaluating antiaircraft gunnery.

AUGMENTATION: Radar, scoring

TARGET: Tow

DESIGNATION: TRX-4/4A Towbee

COMMON NAME: Not applicable

TYPE: Radar tow target

MANUFACTURER: Not available

STATUS: Operational

MILITARY USER: Army

OPERATING SITES: Not available

LAUNCH: Reel launch from MQM-107.

RECOVERY: Not available

PURPOSE & DESCRIPTION: A radar tow target which has replaced the Firebee/Towbee system to support Hawk training firings.

AUGMENTATION: Radar, scoring

CHARACTERISTICS:

Height: Not applicable

Width: 1 foot, 11 3/4 inches
in diameter

Length: 8 feet, 3 inches

Weight: 41 to 47 pounds

Speed: High subsonic

Altitude: Unlimited

TARGET: Tow

DESIGNATION: TA-8 Towbee

COMMON NAME: Not applicable

TYPL: Center-of-gravity towed
target

MANUFACTURER: Hayes Interna-
tional

STATUS: Operational

MILITARY USER: Army

OPERATING SITES: Not available

LAUNCH: Not available

RECOVERY: Not available

PURPOSE & DESCRIPTION: A radar
tow target

AUGMENTATION: Radar, scoring

CHARACTERISTICS:

Height: Not applicable

Width: 7 inches in diameter

Length: 6 feet, 6 inches

Weight: 25 pounds

Speed: Not available

Altitude: Not available

TARGET: Tow

DESIGNATION: Trimaran Tow

CHARACTERISTICS:

COMMON NAME: Trimaran Tow

Height: Not applicable

Width: Not applicable

TYPE: Surface tow target
(water)

Length: 14 feet

Weight: Not available

MANUFACTURER: Purchased to Navy
specifications

Volume: Not applicable

Draft: 6 inches

STATUS: Operational, planned
procurement

Beam: 7 feet, 10 inches

Freeboard: 1 foot

MILITARY USER: Navy

Speed: Towing speed:

OPERATING SITES: Pacific
Missile Test Center

<u>Sea State</u>	<u>Knots</u>
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No chop	30
---------	----

With	20-30
------	-------

Against	15-18
---------	-------

Across	24-28
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LAUNCH: Ship

Altitude: Not applicable

RECOVERY: Ship

PURPOSE & DESCRIPTION: Designed for surface and aerial gunnery training and can be used for visual and radar acquisition training. It has no command or control system and generally is not augmented; however, a corner reflector can be installed to aid in radar acquisition.

AUGMENTATION: Radar

TARGET: Tow

DESIGNATION: Williams Tow

CHARACTERISTICS:

COMMON NAME: Williams

Height: 16 feet

Width: Not applicable

TYPE: Surface tow target
(water)

Length: 27 feet, 9 inches

Weight: 900 pounds (estimated)

MANUFACTURER: Purchased to Navy
specifications

Volume: Not applicable

Draft: 1 foot, 2 inches

STATUS: Operational, planned
procurement

Beam: 14 feet

Freeboard: Not applicable

MILITARY USER: Navy

Speed: Maximum towing speed
10 knots

OPERATING SITES: Pacific
Missile Test Center

Altitude: Not applicable

LAUNCH: Ship

RECOVERY: Ship

PURPOSE & DESCRIPTION: A surface gunnery target consisting of a tubular framework mounted on two pontoons. The target is towed by a sea-going tug with about 5,000 feet of 1 1/8- to 1 1/2-inch double braided nylon line. Wire fabric screens are mounted on both sides of the upper quarter of the framework to provide radar augmentation.

AUGMENTATION: Passive radar

TARGET: Tow

AEROSTATS: Helium filled, blimplike craft available in various sizes. Aerostats are tethered to boats and used to suspend radar targets at specified altitudes above like sea surface. Can also be used in clusters as high contact visual targets for missile firings.

RAFTS: Rafts are inexpensive, easy-to-build, expendable targets used for projects in which the weapon systems are expected to destroy their targets. Rafts can be anchored or towed and can accommodate radar, infrared and visual augmentation.

LOW COST TOW TARGET: A versatile tow target capable of carrying extensive instrumentation and augmentation telemetry packages, remote control cameras, radar beams, strobe lights, chaff ejectors, electronic warfare emitters, infrared sources, and remotely controlled receiver decoders. The Low Cost Tow Target is equipped with an AN/USQ40 scalar scorer, which indicates whether bullets pass through a 5-meter scoring sphere. It is used to test air-to-air gun systems and has also been outfitted with an altitude control system to simulate a seaskimmer antiship missile.

MUCK SUBMARINE: Structure is towed behind a boat to simulate a submarine. It travels at a constant depth, shows a periscope or an electronic countermeasures antenna or both above the surface. It has been augmented with active emitters and can also be used with an acoustic projector.

LIST OF REFERENCES

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- Summary Description of the Gulf Range Drone Control Upgrade System, GRDCUS-TFG-4, Armament Division, 3246 Test Wing, Deputy for Technical Support (TF), Eglin Air Force Base, Florida, GRDCUS-TFG-4, February 1985.
- Drone Formation Control System, Technical Direction, IBM, Volume 9, Number 1, 1983.
- A New Concept for Remote Control of Vehicles in Realistic Tactical Exercises, Kaman Sciences Corporation, Summer 1981.
- Targets Informational Handbook - Past, Present, Future, U.S. Army Missile Command, Redstone Arsenal, Alabama, 1 July 1984.
- U.S. Navy Target System, Technical Publication, TP000007, Rev B, Pacific Missile Test Center, Point Mugu, California, October 1985.
- USAF Aerial Target Station Report, Tri-Service Conference, Redstone Arsenal, Huntsville, Alabama, July 1984.
- Tri-Service Target Meeting Minutes, Pacific Missile Test Center, Point Mugu, California, 24-25 July 1985.
- Technical Support Directorate, Target Support Section, Chesapeake Test Range, Naval Air Test Center, Patuxent River, Maryland, Brochure. (Undated)
- Jane's World Book of Aircraft, Jane's Publishing, Inc., New York, New York, 1984.
- Jane's Armor and Artillery, Jane's Publishing, Inc., New York, New York, 1985-86.

APPENDIX A
Target Contractors

TARGET CONTRACTORS

Private contractors associated with targets and target control systems are listed below.

Beech Aircraft Corporation
Dept 90, B-77
6701 E. Central Avenue
Wichita, KS 67021

Science Applications
International Corporation
1305 Del Norte Ave, Suite 130
Camarillo, CA 930101

Cubic Corporation
9233 Balboa Avenue
San Diego, CA 92123

Vega Precision Laboratories, Inc.
800 Follin Lane
Vienna, VA 22180

Defense Systems Division
P. O. Box 9200
Albuquerque, NM 87119

Digital Design and Manufacturing
P. O. Box 182
Roy, UT 84067

Flight Systems, Inc.
P. O. Box 2400
Newport Beach, CA 96258-0268

IBM Corporation (FSD)
F24
P. O. box 251
White Sands Missile Range, NM
88002

Kaman Sciences Corporation
P. O. Box 7463
Colorado Springs, CO 80933-7463

Micro-Systems
28 Beal Parkway, SW
Ft. Walton Beach, FL 32548

Motorola
TTR-8
2100 E. Elliot
Tempe, AZ 85282

General Electric Government
Services
P. O. Drawer A
White Sands Missile Range, NM
88002

APPENDIX B
Government Points of Contact

GOVERNMENT POINTS OF CONTACT

The following list contains points of contact at member ranges of the RCC Targets Ad Hoc Group and other DOD organizations. For any additions or changes, complete the form at the end of this section. Send the form to Secretariat, Range Commanders Council, Attn: STEWS-SA-R, White Sands Missile Range, White Sands Missile Range, New Mexico 88002.

ARMY

WSMR

Commander
National Range Operations
Operations Control Division
Code: NR-C
White Sands Missile Range, NM 88002

AV: 258-5112
COMM: (505) 678-5112

Commander
National Range Operations
Flight Safety Branch
Code: NR-CF
White Sands Missile Range, NM 88002

AV: 258-4522
COMM: (505) 678-4522

Commander
National Range Operations
Range Control Branch
Code: NR-CR
White Sands Missile Range, NM 88002

AV: 258-1156
COMM: (505) 678-1156

Commander
National Range Operations
Targets Control Division
Code: NR-CR-C
White Sands Missile Range, NM 88002

AV: 258-5312/3325
COMM: (505) 678-5312/3325

Commander
Instrumentation Directorate
Control Systems Branch
Code: ID-F
White Sands Missile Range, NM 88002

AV: 258-2623
COMM: (505) 678-2623

Commander
Instrumentation Directorate
Electronics Division
Code: ID-F
White Sands Missile Range, NM 88002

AV: 258-1537
COMM: (505) 678-1537

Commander
Instrumentation Directorate
Tracking Systems Development Branch
Code: ID-F
White Sands Missile Range, NM 88002

AV: 258-5405
COMM: (505) 678-5405

Commander
Army Material Test and Evaluation
Directorate
Aerial Targets Projects
Code: TE-MF
White Sands Missile Range, NM 88002

AV: 258-2018
COMM: (505) 678-2018

Commander
Army Material Test and Evaluation
Directorate
Ground Targets
Code: TE-LG
White Sands Missile Range, NM 88002

AV: 258-6125
COMM: (505) 678-6125

Commander
Army Material Test and Evaluation
Directorate
Land Combat Targets
Code: TE-LG
White Sands Missile Range, NM 88002

AV: 258-6126
COMM: (505) 678-6126

YPG

Commander
U. S. Army Yuma Proving Ground
Field Instrumentation Section
Code: STEYP-MT-TE-I
Yuma, AZ 85365-9103

AV: 899-3184/3253
COMM: (602) 328-3184/3253

TECOM

Commander
Test and Evaluation Command
Management of Target and Threat
Simulators
Attn: AMSTE-TC-T
Aberdeen Proving Ground, MD
21005-5055

AV: 298-7885
COMM: (301) 278-7885

NAVY

NWC

Commander
Naval Weapons Center
Drone Projects Engineer
Code: 6131
China Lake, CA 93555-6001

AV: 437-2288
COMM: (619) 939-2288

Commander
Naval Weapons Center
Engineering Support Division
Code: 613
China Lake, CA 93555-6001

AV: 437-5212
COMM: (619) 939-5212

Commander
Naval Weapons Center
FSAT Program Manager
Code: 6101
China Lake, CA 93555-6001

AV: 437-5449
COMM: (619) 939-5449

Commander
Naval Weapons Center
Ground Targets
Code: 6221
China Lake, CA 93555-6001

AV: 437-5814/5884
COMM: (619) 939-5814/5884

Commander
Naval Weapons Center
QF-X Technical Manager
Code: 6101C
China Lake, CA 93555-6001

AV: 437-5094
COMM: (619) 939-5094

Commander
Naval Weapons Center
QF-4 Technical Manager
Code: 6101B
China Lake, CA 93555-6001

AV: 437-5406
COMM: (619) 939-5406

Commander
Naval Weapons Center
QF-86 Technical Manager
Code: 6101A
China Lake, CA 93555-6001

AV: 437-5084
COMM: (619) 939-5084

Commander
Naval Weapons Center
QH-50 Controller
Code: 61312
China Lake, CA 93555-6001

AV: 437-5258
COMM: (619) 939-5084

Commander
Naval Weapons Center
QH-50 Operations
Code: 61312
China Lake, CA 93555-6001

AV: 437-6236
COMM: (619) 939-6236

Commander
Naval Weapons Center
Target Operations Branch
Code: 6115
China Lake, CA 93555-6001

AV: 437-5090
COMM: (619) 939-5090

Commander
Naval Weapons Center
TCS Program Manager
Code: 6101E
China Lake, CA 93555-6001

AV: 437-5556
COMM: (619) 939-5556

Commander
Naval Weapons Center
Tracking and Control Branch
Code: 6131
China Lake, CA 93555-6001

AV: 437-5851
COMM: (619) 939-5851

NATC

Commander
Naval Air Test Center
Aerial Targets
Code: RD-64
Patuxent River, MD 20670-5304

AV: 356-1309
COMM: (301) 863-1309

Commander
Naval Air Test Center
Electronics Control
Code: RU-64
Patuxent River, MD 20670-5304

AV: 356-1310
COMM: (301) 863-1310

Commander
Naval Air Test Center
Surface Targets
Code: RD-64
Patuxent River, MD 20670-5304

AV: 356-7624
COMM: (301) 863-7624

Commander
Naval Air Test Center
Target Hulks
Code: RD-64
Patuxent River, MD 20670-5304

AV: 356-1308
COMM: (301) 863-1308

Commander
Naval Air Test Center
Target Hulks (Solomon)
Code: RD-64
Patuxent River, MD 20670-5304

AV: 356-1308
COMM: (301) 863-1308

Commander
Naval Air Test Center
Target Section
Code: RD-64
Patuxent River, MD 20670-5304

AV: 356-1304
COMM: (301) 863-1304

Commander
Naval Air Test Center
VANDAL (Wallops)
Code: RD-64
Patuxent River, MD 20670-5304

COMM: (804) 824-5857

PMTc

Commander
Pacific Missile Test Center
Aircraft Targets Division
Code: 5030
Point Mugu, CA 93042-5000

AV: 351-7430/8671

Commander
Pacific Missile Test Center
Chief Engineer
Code: 5001
Point Mugu, CA 93042-5000

AV: 351-8157/8648

Commander
Pacific Missile Test Center
Targets Directorate
Director
Code: 5000
Point Mugu, CA 93042-5000

AV: 351-8157/8648

Commander
Pacific Missile Test Center
Engineering Branch
Code: 5021
Point Mugu, CA 93042-5000

AV: 351-8781/7976/7979

Commander
Pacific Missile Test Center
Missile Targets Division
Code: 5020
Point Mugu, CA 93042-5000

AV: 351-8781/7976

Commander
Pacific Missile Test Center
Special Targets Branch
Code: 5023
Point Mugu, CA 93042-5000

AV: 351-8781

Commander
Pacific Missile Test Center
Surface Targets Branch
Code: 5040
Point Mugu, CA 93042-5000

COMM: (805) 982-3236/4480

Commander
Pacific Missile Test Center
Target Programs Management Office
Code: 5090-5095
Point Mugu, CA 93042-5000

AV: 351-8326
COMM: (805) 484-6561

AIR FORCE

Department of the Air Force
Aerial Targets Program Element
Manager (PEM)
HQ USAF/RDPT
Washington, DC 20330

AV: 224-4590

AFSC

Air Force Systems Command
Aerial Targets Systems Offices
(SYSTO) (AFSC PEM)
HQ AFSC/SDZC
Andrews Air Force Base
Washington, D.C. 20334

AV: 858-7343

Air Force Systems Command
Hardened Targets Systems Officer
(SYSTO)
HQ AFSC/SDZD
Andrews Air Force Base
Washington, D.C. 20334

AV: 858-4906

AD

Commander
Armament Division
AF Aerial Target Development
and Acquisition
AD/YIQ
Eglin AFB, FL 32542

AV: 872-3410

Commander
Armament Division
3246 Test Wing
Surface/hardened Targets Engrg
3246 TESTW/TFK
Eglin AFB, FL 32542

AV: 872-2701

Commander
Armament Division
3246 Test Wing Office of Plans
and Requirements
3247 TESTW/XPX
Eglin AFB, FL 32542

AV: 872-3410

Commander
Armament Division
Gulf Range Long Range Plans
3247 TESTW/XPX
Eglin AFB, FL 32542

AV: 872-8241

Commander
Armament Division
3246 Test Wing
Test Program Plans
3246 TESTW/TZP
Eglin AFB, FL 32542

AV: 872-4257

Commander
Armament Division
3246 Test Wing - Dep CC
for Technical Support
3246 TESTW/TFR
Eglin AFB, FL 32542

AV: 872-4481

Commander
Armament Division
3246 Test Wing
Target Vehicle Control Sys
Engr (MTRACS/GRUCUS)
3246 TESTW/TFU
Eglin AFB, FL 32542

AV: 872-3169

Commander
Armament Division
3246 Test Wing
Target Vehicle Resources/Plans
3246 TESTW/LGX
Eglin AFB, FL 32542

AV: 872-3535

Commander
Armament Division
3246 Test Wing
RF Remote Control Vehicle Sys
3246 TESTW/MAAMIR
Eglin AFB, FL 32542

AV: 872-5613

Commander
Armament Division
3202 Civ Engr Sqdrn
Range Support Branch
AD/DLMT
Eglin AFB, FL 32542

AV: 872-3568

Commander, Armament Division
3202 Civ Engr Sqdrn
Armor/Vehicle Fleet Mechanics
AD/DLMT
Eglin AFB, FL 32542

AV: 872-8319

Commander
475 Weapons Evaluation Group
Det 1, 475 WEG
Aerial Targets Support for
White Sands Missile Range
Holloman AFB, NM 88330

AV: 867-5382

TFWC

Commander
Tactical Fighter Weapons Center
IIWC Ground Targets
554 RANG/DOY
Nellis AFB, NV 89191

AV: 682-3613

Commander
Air Force Logistics Command
QF-100 Aerial Target System
SM-ALC/MMSMW
McClellan AFB, CA 95052

AV: 633-4402

Air Force Logistics Command
MQM-107B Aerial Target System
WR-ALC/MMTMA
Robins AFB, GA 31098

AV: 468-2601

TAC

Commander
Tactical Air Command
Chief, Aerial Targets (TAC-PEM)
HQ TAC/DR
Langley AFB, VA 23665

AV: 574-5914

Commander
Tactical Air Command
Weapons System Evaluation Program
Targets Monitor
HQ TAC/DOO
Langley AFB, VA 23665

AV: 574-7660

Commander
Tactical Air Command
Aerial Targets Support
HQ TAC/LGM
Langley AFB, VA 23665

AV: 574-4257

475 WEG

Commander
475 Weapons Evaluation Group
Range Upgrade Branch
475 WEG/XRM
Tyndall AFB, FL 32403

AV: 970-2191

Commander
Range Engineering Branch
475 Weapons Evaluation Group
475 WEG/XRE
Tyndall AFB, FL 32403

AV: 970-2191

Commander
475 Weapons Evaluation Group
Aerial Targets Systems Division
475 WEG/YM
Tyndall AFB, FL 32403

AV: 970-4171

APPENDIX C

**Change Request Forms:
Equipment
Target Contractors
and
Government Points of Contact**

Use the forms in this appendix for comments, recommendations, additions, deletions, and changes. If additional space is needed, attach your typed comments to the form. Please note that there are different forms for each type of target. In addition to the target forms, a point of contact change form is included.

Submit comments or changes to

Secretariat
Range Commanders Council
Attn: STEWS-SA-R
White Sands Missile Range, NM 88002

TARGET: Aerial

DESIGNATION:	CONTROL SYSTEM:
COMMON NAME:	AUGMENTATION:
TYPE:	CHARACTERISTICS:
MANUFACTURER:	Height:
STATUS:	Length:
MILITARY USER:	Wing Span:
OPERATING SITES:	Weight:
LAUNCH:	Speed:
RECOVERY:	Altitude:
POWERPLANT:	Endurance:
PURPOSE:	
CAPABILITIES:	

TARGET: Land

DESIGNATION:

CONTROL SYSTEM:

COMMON NAME:

AUGMENTATION:

TYPE:

CHARACTERISTICS:

MANUFACTURER:

Height:

Width:

STATUS:

Length:

MILITARY USER:

Weight:

Speed:

OPERATING SITES:

Altitude:

Endurance:

LAUNCH:

RECOVERY:

POWERPLANT:

PURPOSE:

CAPABILITIES:

TARGET: Seaborne

DESIGNATION:	CONTROL SYSTEM:
COMMON NAME:	AUGMENTATION:
TYPE:	CHARACTERISTICS:
MANUFACTURER:	Length:
STATUS:	Beam:
MILITARY USER:	Freeboard:
OPERATING SITES:	Draft:
LAUNCH:	Weight:
RECOVERY:	Speed:
POWERPLANT:	Endurance:
PURPOSE:	
CAPABILITIES:	

TARGET: Tow

DESIGNATION:

CONTROL SYSTEM:

COMMON NAME:

AUGMENTATION:

TYPE:

CHARACTERISTICS:

MANUFACTURER:

Height:

Width:

STATUS:

Length:

MILITARY USER:

Weight:

Volume:

OPERATING SITES:

Draft:

LAUNCH:

Beam:

Freeboard:

RECOVERY:

Speed:

POWERPLANT:

Altitude:

Endurance

PURPOSE & DESCRIPTION:

CAPABILITIES:

RCC DOCUMENT 650-88
TARGETS DIRECTORY
POINT OF CONTACT FORM

To request corrections or changes in the entries in appendix A, Target Contractors, or appendix B, Government Points of Contact, forward a completed copy of this form to the Range Commanders Council. Refer to appendixes A or B for correct format.

ADDITION _____ DELETION _____ CHANGE _____

Current Listing

New Listing

Service: _____

Service: _____

Address: _____

Address: _____

Phone: _____

Phone: _____

Comments:

